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James LaFrentz Asbestos Dose Report of

Kenneth S. Garza, CIH, MS

James B. LaFrentz, et al., vs. 3M Company, et al.

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Exhibit 5

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James LaFrentz General Asbestos Dose Report of Kenneth S. Garza, CIH, MS

James LaFrentz, et al., vs. 3M Company, et al.

United States District Court, Southern District of Texas, Houston Division

Case No. 4:18-CV-04229

1. Introduction

This report contains the table clarifications and opinions of Kenneth S. Garza, CIH, MS for the above referenced case. This report is based on a review of the case-specific documentation, pertinent industrial hygiene literature, exposure assessment studies cited herein, and my qualifications, experience, and professional judgement as a Certified Industrial Hygienist. My background education includes a B.S. Biology, minor Chemistry, an M.S. Environmental Science and Management. I am certified by the American Board of Industrial Hygiene as a Certified Industrial Hygienist (CIH). I am also a Texas Department of State Health Services (TDSHS) and State of Florida Department of Business and Professional Regulation (DBPR) licensed asbestos consultant for asbestos issues related to air monitoring, management planning, inspection and abatement project design. I have conducted industrial hygiene related activities dealing with asbestos hazards for 17 years.

Selected industrial hygiene, scientific, regulatory, and other documents which I considered are cited in Appendix A. Plaintiff's asbestos dose calculation and industrial hygiene, scientific, and regulatory literature upon which I relied on in calculating asbestos dose are cited in Appendix B. My curriculum vitae is in Appendix C. My expert testimony history is given in Appendix D. My compensation is given in Appendix E. Appendix F contains general asbestos literature review, opinions, and references as it relates to asbestos and asbestos exposure. Appendix G contains the deposition summary relied upon.

The purpose of this report is to provide industrial hygiene opinions about 1) exposure and potential exposures to airborne asbestos, 2) specific exposures form various asbestos-containing products, and 3) Plaintiff specific asbestos dose calculation from work with and/or around asbestos-containing materials. My review of case specific information includes: Video Deposition of James LaFrentz, Volume I, dated November 14, 2018; Video Deposition of James LaFrentz, Volume II, dated November 15, 2018; and other case-specific information.

Based on my review of the case-specific information, this report will discuss the asbestos exposure of Mr. James LaFrentz during drilling and sanding activities with coupons/panels and subsequent debris cleanup.

“Asbestos has been used in cement products, plaster, fireproof textiles, vinyl floor tiles, thermal and acoustical insulation, and sprayed materials.” (USEPA, 1979) “Asbestos fibers do not have any detectable odor or taste. They do not dissolve in water or evaporate and are resistant to heat, fire, chemical and biological degradation. … As a result of its low cost and desirable properties such as heat and fire resistance, wear and friction characteristics, tensile strength, heat, electrical and sound insulation, adsorption capacity, and resistance to chemical and biological attack, asbestos has been used in a very large number of applications and types of products.” (ATSDR, 2001) According to Hueper, 1942, “The production of asbestos has risen enormously in recent years. It received this great impetus from its use in the automobile industry. … Occupational contact with asbestos is present in many industries using asbestos products. Asbestos is employed for a great variety of purposes, such as the manufacture of incombustible and insulating materials (fire resistant clothes, blankets, theater curtains, sheets, ropes, cords, twine, and threads), filter cloths, mill-board, wall board, shingles, tiles, mortar (together with cement and plaster of Paris for providing a fire-proof wall lining), clinkers, gaskets, packing material of pumps, insulating material of steam pipes, water pipes, boilers, and electric wires, brake lining, paper, mattresses, adsorbent dyes (for manufacture of fire proof and acid proof stains), ingredient of rubber products, and artificial wood.” (Hueper, 1942)

2. Dose Calculation

To calculate an asbestos dose as represented in **Fiber-Years/cc**, qualitative descriptors of work activities are essential to compare against the measured airborne asbestos exposures in the historic and present day industrial hygiene literature. Other information such as duration of work activities and frequency of work activities are required as well. Refer to Appendix B for the asbestos dose calculation for this case.

The latency period for asbestos-related mesothelioma is long, with a mean value of 30 to 40 years. As exposure level decreases, the latency period generally increases. An inverse relationship between increasing amounts of asbestos exposure and the shortening of the necessary latency period for development of asbestos disease has been understood and relevant as scientific fact for over 70 years. (Merewether, 1930) (Neuman, 2001) (Bianchi, 1997).

“Asbestos exposure is generally measured in terms of total or cumulative dose. Total dose, also referred to as cumulative exposure or cumulative dose, is a measure of the amount of asbestos inhaled; it is the product of the duration of exposure (in years [y]) and the intensity of exposure. … A person exposed to airborne asbestos at 2 f/cc for 20 years (40 fiber-years/cc [f-y/cc]) has the same total dose as a person

who is exposed to asbestos at 4 f/cc for 10 years [40 f-y/cc]).” (OSHA, 1986) The calculation of an asbestos dose, as represented in Fiber-Years/cc, requires 1) qualitative descriptors of a work or task activity (e.g., wire brushing gaskets), 2) a value for a quantitative values of frequency per work or task activity (e.g., once a week, every day, twice a day, once a month), 3) quantitative values for duration per work or task activity (usually represented in units of time: seconds, minutes, hours), 4) the quantitative value of exposure (typically reported in fiber per cubic centimeter (f/cc)) as measured in the historic and/or present day industrial hygiene literature related to that work or task activity, 5) and length of work practice time or task activity (usually represented in years) lasted. (AIHA, 2008)

3. Qualitative/Low Dose Exposure

Qualitative and/or low dose descriptors and their relationship to asbestos disease has been noted. No threshold of exposure to asbestos has been identified. OSHA does not consider the current PEL’s to be fully protective. “OSHA's risk assessment also showed that reducing exposure to 0.1 f/cc would further reduce, but not eliminate, significant risk.” This significant risk would apply to all fiber types regulated by OSHA. Regulatory standards and guidelines intended to limit exposure to asbestos air concentrations were developed with the prevention of asbestosis in mind, and were not intended to and do not fully protect against the development of mesothelioma. OSHA stated that the initial OSHA PEL limits were intended primarily to protect employees against asbestosis and it was hoped that they would provide some incidental degree of protection against asbestos induced forms of cancer. (OSHA, 1994)

“No safe limit or ‘threshold’ of exposure is known. Any exposure to asbestos carries some risk to health, and people exposed to low levels of asbestos for a very brief period have later contracted mesothelioma.” (EPA, 1980) Also, “exposure levels below those allowed for asbestos workers, the risk of asbestosis is negligible. Some scarring of lung tissue may appear on X-rays after many years of low exposure, but no impairment of respiratory function is likely to occur. **However**, the incidence of lung cancer and mesothelioma exceeds baseline rates even at very low exposure levels.” (USEPA, 1983) {emphasis added} “Avoiding unnecessary exposure to asbestos is prudent.” (USEPA, 1985) “While lowering exposure lowers risk, there is no known level of exposure to asbestos below which health effects do not occur. … Mesothelioma is a type of fatal cancer of the lining of the chest or abdominal cavity. It can be caused by very low exposures to asbestos. This cancer has occurred among brake mechanics their wives and their children.” (USEPA, 1986) In a 1991 joint EPA and National Institute of Occupational Safety and Health (NIOSH) document, “NIOSH contends that there is no safe airborne fiber concentration for asbestos.

NIOSH therefore believes that any detectable concentration of asbestos in the workplace warrants further evaluation and, if necessary, the implementation of measures to reduce exposures.” (USEPA, 1991)

“There are data that show that the lower the exposure, the lower the risk of developing cancer. Excessive cancer risks have been demonstrated at all fiber concentrations studied to date. Evaluation of all available human data provides no evidence for a threshold or for a ‘safe’ level of asbestos exposure.” Furthermore, “[t]his recommended standard of 100,000 fibers >5 µm in length/m^3 [0.1 f/cc] is intended to (1) protect against the noncarcinogenic effects of asbestos, (2) materially reduce the risk of asbestos-induced cancer (only a ban can assure protection against carcinogenic effects of asbestos) and (3) be measured by techniques that are valid, reproducible, and available to industry and official agencies.” (NIOSH, 1976) "[E]xcessive cancer risks have been demonstrated at all fiber concentrations studied to date. Evaluation of all available human data provides no evidence for a threshold or for a 'safe' level of asbestos exposure." (NIOSH, 1980) The U.S. Department of Health and Human Service has found that "Mesothelioma has occurred following short term asbestos exposures of only a few weeks, and can result from very low levels of exposure." (NIOSH, 1995).

"The Commission has noted that in the scientific literature there is general agreement that there is no known threshold level below which exposure to respirable free-form asbestos would be considered safe." (CPSC, 1977). A scientific Panel appointed by the World Trade Organization found that "on the basis of scientific evidence that 'no minimum threshold of level of exposure or duration of exposure has been identified with regard to the risk of pathologies associated with chrysotile, except for asbestosis.' The pathologies which the Panels identified as being associated with chrysotile are of very serious nature, namely lung cancer and mesothelioma." (WTO, 2001) “The WHO [World Health Organization] concludes there is no threshold exposure level below which exposure to asbestos dust would be free of hazard to health. (IPCS, WHO, 1998) (WHO, 2006) In a review from Dodson on this subject, he reiterates the WHO’s position, that “[T]he human evidence has not demonstrated that there is a threshold exposure level for lung cancer or mesothelioma, below which exposure to asbestos dust would not be free of hazard to health.’ [in addition] The International Programme for Chemical Safety (IPCS) has reiterated this position.” (Dodson, 2006)

According to Stokinger, “There is still one group of substances for which some method should be devised for establishing safe air standards - the industrial cancerigens. … As a suggested method of approach, the following is offered: To the level judged safe for other types of systemic injury add a safety factor for

carcinogenicity. The magnitude of the safety factor is suggested to be from 100 to 500." (Stokinger, 1956). "There is no evidence of a threshold level below which there is no risk of mesothelioma. Low level exposures more often than not contain peak concentrations which can be very high for short periods of time." (Hillerdal, 1999). "Mesothelioma may occur following relatively brief or low-level exposures to asbestos, and most patients lack the histologic features of asbestosis, which is generally associated with heavier exposures to asbestos." Also, Roggli notes from another study, 144 mesothelioma patients, 6% of these patients were exposed to asbestos for less than 3 months. (Roggli, 1995) "A significant excess of mesothelioma was observed for levels of cumulative exposure that were probably far below the limits adopted in most industrial countries during the 1980s." (Iwatsubo, 1998).

There is no basis for accepting any workplace or non-occupational exposure to asbestos above ambient background as "safe." Any asbestos exposure above ambient levels is to be avoided and any such exposure may contribute to disease in some individuals. The human respiratory system is not selective as to the source (product) of airborne asbestos during inhalation; therefore, if there actually is a lifetime dose-response relationship for some diseases, any asbestos body burden added by workplace exposure above ambient contributes to risk of disease, regardless of the product types, manufacturers, worksites, or exposure averages. If no safe threshold exists for some asbestos-related conditions, such as mesothelioma, then the conclusion is the same.

4. Background Exposure

According to Agency for Toxic Substances and Disease Registry (ATSDR), "[t]he results of numerous measurements indicate that average concentrations of asbestos in ambient outdoor air are within the range of 10^{-8} [0.00000001] [to] 10^{-4} [0.0001] PCM f/mL; levels in urban areas may be an order of magnitude higher than those in rural areas. … Indoor air concentrations of asbestos ranged from approximately 10^{-5} [0.00001] to 10^{-4} [0.0001] f/mL in a study of air concentrations measured in a total of 315 U.S. public and commercial facilities." (ATSDR, 2001) Using the background lowest and highest (ambient) magnitude exposure range of 10^{-8} (0.00000001) to 10^{-4} (0.0001) fiber/mL, and a person's lifetime of 70 years, a lifetime dose to ambient asbestos conditions, and no other asbestos exposure, a dose calculation magnitude range can be determined: 10^{-8} (0.00000001) fiber/mL X 70 years = 7^{-7} (0.0000007) fiber-year/mL; to 10^{-4} (0.0001) fiber/mL X 70 years = 7^{-3} (0.007) fiber-year/mL. The ATSDR further reports estimates of fiber-year/mL for the general population based on assumed exposure criteria for ambient outdoor air concentrations (2 x 10^{-6} PCM fiber/mL) and indoor air concentrations (3 x 10^{-6} PCM fiber/mL):

20 m^3/day of air breathed, 70 years of exposure, 10% of time outdoors as **0.000014 fiber-year/mL**; and 20 m^3/day of air breathed, 70 years of exposure, 90% of time indoors as **0.00019 fiber-year/mL**. (ATSDR, 2001) Combining the 10% outdoor with the 90% indoor lifetime dose yields a total lifetime dose of **0.000204 fiber-year/mL** (0.000014 fiber-year/mL + 0.00019 fiber-year/mL). It should be noted that units "fiber/cc" or "fiber/cm^3" (fibers per cubic centimeter) and "fiber/ml" (fibers per milliliter), have the same quantitative meaning.

A study by McDonald states, "In most industrialized countries, the disease [mesothelioma] has increased much more rapidly in males than females, reflecting the impact of occupational asbestos exposure 30-40 yrs earlier. Backward extrapolation of these trends suggests that, before the diverging pattern began, mortality was about 1-2 per million population in both sexes." (McDonald, 1996) According to Hillerdal, "There might exist a background level of mesothelioma occurring in the absence of exposure ot [sic] asbestos, but there is no proof of this and this 'natural level' is probably much lower than the 1-2/million/year which has been often cited." (Hillerdal, 1999) Other authors have used this 1-2 per million estimate in their own reviews as well. (Lemen, 2004) (Neumann, 2001) (Scherbakov, 2001) (Iwatsubo, 1998)

The EPA extrapolated risk for mesothelioma and lung cancer occurrence in 1986. "The best estimate of risk to the United States general population for a lifetime continuous exposure to 0.0001 f/ml [the upper end, 10^{-4}, of the ATSDR reported range for background exposure, lifetime dose of 0.007 fiber/mL-year] is 2.8 mesothelioma deaths and 0.5 excess lung cancer deaths per 100,000 females [28 per million and 5 per million, respectively]. Corresponding numbers for males are 1.9 mesothelioma deaths and 1.7 excess lung cancer deaths per 100,000 individuals [19 per million and 17 per million, respectively]." (EPA, 1986)

5. Occupational Exposures

Again, according to the EPA, for an exposure of **0.0001 fiber/mL, starting the exposure at the age of 20 for 20-years (0.002 fiber-year/mL),** yields a mesothelioma mortality of 0.7 per 100,000 and a lung cancer mortality of 0.2 per 100,000 for females (7 per million and 2 per million, respectively). For males, 0.4 per 100,000 for mesothelioma mortality and of 0.6 per 100,000 for lung cancer mortality (4 per million and 6 per million, respectively). For an exposure of **0.01 f/cc, starting the exposure at the age of 20 for 1-year (0.01 fiber-year/mL),** yields a mesothelioma mortality of 5.6 per 100,000 and a lung cancer mortality of 1.0 per 100,000 for females (56 per million and 10 per million, respectively). For males, 4.1 per 100,000 for mesothelioma and 3.1 per 100,000 for lung cancer (41 per million and 31 per million, respectively).

For an exposure of 0.01 f/cc starting the exposure at the age of 20 for 20-years (0.2 fiber-year/mL), yields a mesothelioma mortality of 65.7 per 100,000 and a lung cancer mortality of 18.2 per 100,000 for females (657 per million and 182 per million, respectively). For males, 44.5 per 100,000 and a lung cancer mortality of 59.4 per 100,000 (445 per million and 594 per million, respectively). For an exposure of **0.01 f/mL, starting the exposure at the age of 20 for a 70 year lifetime or 50 years of exposure (0.5 fiber-year/mL),** yields a mesothelioma mortality of 78.8 per 100,000 and a lung cancer mortality of 34.3 per 100,000 for females (788 per million and 343 per million, respectively). For males, 51.7 per 100,000 for mesothelioma and 113 per 100,000 for lung cancer (517 per million and 1,113 per million, respectively). It should be noted that the calculation estimates reported "will likely underestimate (by perhaps a factor of 4) the mesothelioma risk to aerosols containing predominately crocidolite asbestos. Conversely, in some pure chrysotile exposure circumstances (such as mining and milling), the risk will be overestimated. (EPA, 1986)

According to OSHA in 1986, "OSHA is aware of no instance in which exposure to a toxic substance has more clearly demonstrated detrimental health effects on humans than has asbestos exposure." OSHA calculated quantitative risk for cancer mortality. **For an exposure of 0.1 f/cc starting the exposure at the age of 25 for 1-year (0.1 fiber-year/mL),** yields a mesothelioma mortality of 6.9 per 100,000 and a lung cancer mortality of 7.2 per 100,000 (69 per million and 72 per million, respectively). **For an exposure of 0.1 f/cc starting the exposure at the age of 25 for 20-years (2.0 fiber-year/mL),** yields a mesothelioma mortality of 73 per 100,000 and a lung cancer mortality of 139 per 100,000 (730 per million and 1,139 per million, respectively). **For an exposure of 0.1 f/cc starting the exposure at the age of 25 for 45-years (4.5 fiber-year/mL),** yields a mesothelioma mortality of 82 per 100,000 and a lung cancer mortality of 231 per 100,000 (820 per million and 2,310 per million, respectively). "OSHA has, in its Quantitative Risk Assessment (see Section V) and in the establishment of a permissible exposure limit (see Section X) recognize that all types of asbestos fiber have the same fibrogenic and carcinogenic potential." (OSHA, 1986) In 1994, OSHA concluded that "[t]he Agency believes that the studies used to derive risk estimates remain valid and reliable, and that OSHA's decision to not separate fiber types for purposes of risk analysis is neither scientifically nor regulatorily incorrect. There are at least three reasons for OSHA's decision not to separate fiber types. A. First, OSHA believes that the evidence in the record supports similar potency for chrysotile and amphiboles with regard to lung cancer and asbestosis. The evidence submitted in support of the claim that chrysotile asbestos is less toxic than other asbestos fiber types is related

primarily to mesothelioma. This evidence is unpersuasive, and it provides an insufficient basis upon which to regulate that fiber type less stringently." (OSHA, 1994)

The OSHA risk assessment was later adopted by the Mine Safety and Health Administration in 2008. "MSHA has determined that OSHA's 1986 asbestos risk assessment (51 FR 22644) is applicable to asbestos exposures in mining. In developing this final rule, MSHA also evaluated studies published since OSHA completed its 1986 risk assessment, and studies that specifically focused on asbestos exposures of miners. These additional studies corroborated OSHA's conclusions in its risk assessment." With regard to risk and fiber type, MSHA mentions that "Some commentators stated that there is a differential health risk related to fiber type and that OSHA's risk assessment is not adequate or appropriate for the mining industry. The OSHA's risk assessment addresses adverse health effects from exposure to six asbestos minerals. MSHA applies TEM analysis to its PCM results to determine exposure to these same six asbestos minerals. Exposure of miners to these asbestos minerals, at the same concentrations and lengths of exposures as workers in other industries, can be expected to result in the same disease endpoints as quantified in OSHA's risk assessment." (MSHA, 2008)

See Table 1 for the Mesothelioma Risk Assessments for Men as developed by the EPA (1986), OSHA (1986), and MSHA (2008).

6. Epidemiological Studies

Risk is defined as the incidence of disease divided by the population. In other words, if your population is 100 people and 10 people have been diagnosed with a specific disease, then the risk is 10 divided by 100, which equals 0.1 or 10%. The Relative Risk or Risk Ratio (RR) is defined as the incidence of disease in an exposed population divided by the incidence of disease in an unexposed (control) population. When you have a Relative Risk of 2 or greater, then it is said that the incidence of disease is attributed to the exposure and not some other factor. Epidemiological studies for asbestos are often case-control studies, and the results can be presented as Odds Ratios (OR). The Odds Ratio is defined as odds of the incidence of disease in an exposed population divided by the odds of the incidence of disease in an unexposed (control) population. An Odds Ratio greater than 1 is said to show an increased risk. When a disease is rare, 10% or less, then the Odds Ratio and the Relative Risk are approximately equal. (Machin, 2007) (Reference Manual on Scientific Evidence, 2011) As stated by Hillerdal, "even with heavy exposure only up to 10% of a cohort will die from mesothelioma" satisfying the idea that mesothelioma is a rare disease. (Hillerdal, 1999). Therefore, for mesothelioma, the Odds Ratio is equivalent to the Relative Risk.

With regard to “mixed fiber” related epidemiological studies (studies in which authors do not distinguish between asbestos fiber type; serpentine or amphibole), an increase in incidence of mesothelioma at cumulative doses well below 1.0 fiber-years/mL is observed. A French study in which the “job histories … subjects were evaluated by a group of experts for exposure to asbestos fibers according to probability, intensity, and frequency” found that the odds ratio (as represented in a cumulative exposure index) for pleural mesothelioma was 1.2 (CI 0.8-1.8) for cumulative exposures that ranged from 0.001 to 0.49 fiber-years/mL, 4.2 (CI 2.0-8.8) for cumulative exposures that ranged from 0.5 to 0.99 fiber-years/mL, 5.2 (CI 3.1-8.8) for cumulative exposures that ranged from 1.0 to 9.9 fiber-years/mL, and 8.7 (CI 4.1-18.5) for cumulative exposures that were ≥10.0 fiber-years/mL. “We found a clear dose-response relation between cumulative asbestos exposure and pleural mesothelioma in a population-based case-control study with retrospective assessment of exposure.” (Iwatsubo, 1998). Similarly in 2001, a study found that a cumulative exposure dose between >0.00 and 0.15 fiber-years/mL was associated with an increased risk, reported as an odds ratio, of 7.9 (CI 2.1-30.0), and that a cumulative exposure between 0.15 and 1.5 fiber-years/mL was associated with an increased risk, reported as an odds ratio, of 21.9 (CI 5.7-83.8). Other "results confirm the previous reported observation of a distinct dose-response relationship [between asbestos and mesothelioma] even at levels of accumulation exposure below 1 fiber year." (Rodelsperger, 2001) In another French population-based case-control study, conducted from 1998 to 2002, and as reported in an oral session, similarly found “a significant dose-response relationship” at relatively low cumulative dose, reported as an odds ratio of 2.8 (95% CI 1.7-4.7) for cumulative exposures between 0.0 and 0.07 fiber-years/mL. (Rolland, 2006) In a 2014 study involving 437 incidental cases and 874 controls, the authors reported “a clear dose relationship” reported as an odds ratio of 4.0 (99% CI 1.9-8.3) for men exposed at less than 0.1 fiber-years/mL, and as reported as an odds ratio of 8.3 (99% CI 3.8 to 17.7) for exposures between 0.1 and 1.0 fiber-years/mL. (Lacourt, 2014) A 2015 study reported, “…All subjects … ≥0.1-<1” had an OR of “4.4 (1.7 to 11.33). … Non-occupationally exposed only … ≥0.1-<1” had an OR of “3.8 (1.3 to 11.1) …” (Ferrante, 2015)

See Table 2 for Low Doses and Odds Ratios.

“There is a broad consensus that chrysotile asbestos causes human malignant mesothelioma.” (Markovitz, 2015) This is clear in the scientific literature. (Hueper, 1965) (NIOSH, 1980) (OSHA, 1994) (Smith, 1996) (Stayner, 1996) (Landrigani, 1999) (ATSDR, 2001) (Kashansky, 2001) (WHO, 2006) (Dodson, 2006) (Kanarek, 2011)

Relatively low exposures can causes mesothelioma in the context of chrysotile-only (no amphibole/tremolite contamination) exposures, as well. Studies conducted in Russia at the Uralbest mining and milling operations (the "Russian studies") have examined exposures to chrysotile asbestos and reported asbestos-related disease experienced by workers at the facilities and by the population in the surrounding geographic area. The Uralbest chrysotile mining and milling operations are the largest in the world and therefore provide a great opportunity to study health effects of chrysotile exposure. (Tossavainen, 1999) (Kashansky, 2001) (Shcherbakov, 2001) Similar results were found in a study of Lithuanians exposed to chrysotile asbestos from Russia. This study assessed asbestos exposure retrospectively in lung cancer and mesothelioma patients in Lithuania. All asbestos used in Lithuania is imported from Russia and is mainly chrysotile, and all patients with asbestos fibers detected had only chrysotile asbestos in their lungs. One of the patients with mesothelioma had occupational asbestos exposure assessed at 8.8 fiber-year/mL, and only chrysotile asbestos fibers were found. However, the three other mesothelioma patients in the study each had cumulative exposures less than 0.01 fiber-years/cc. (Everatt, 2007)

In 2000, Hodgson and Darnton published an analysis that quantified the risk of mesothelioma based on exposure to different asbestos fiber types. Their review relied on seventeen separate epidemiological studies, with findings calculated to a 95% confidence interval that included cohort mortality reports for which quantitative data on exposure was available, including six chrysotile cohorts. They quantified the risk of mesothelioma at different levels of cumulative exposure, by fiber type. Specifically, for chrysotile, they determined that a cumulative exposure of 1.0 fiber-years/cc to chrysotile asbestos reported a risk of about 5 deaths per 100,000 exposed (50 per million) or highest arguable estimate of 20 and lowest 1; a cumulative exposure of 0.1 fiber-years/cc to chrysotile asbestos reported, “Risk probably insignificant, highest arguable estimate 4 death per 100,000” (40 per million); a cumulative exposure of 0.01 fiber-years/cc to chrysotile asbestos reported, “Risk probably insignificant, highest arguable estimate 1 death per 100,000” (10 per million); a cumulative exposure of 0.005 fiber-years/cc to chrysotile asbestos was reported as “insignificant.” (Hodgson, 2000)

See Table 3 for the Mesothelioma Risk Assessments for Men as developed by the EPA (1986), OSHA (1986) with estimates developed by Hodgson & Darnton (2000). This does not include the re-evaluation of the Loomis (2009) results discussed in Hodgson & Darnton (2010) or additional results as discussed in Markowitz (2015).

In 2010, Hodgson and Darnton reanalyzed their data in light of the 2009 Loomis study of North Carolina textile workers exposed to chrysotile asbestos only. Based on the Loomis findings, they determined that the risk of mesothelioma for chrysotile-exposed asbestos workers "is higher by a factor of 10 than that which emerged from our meta-analysis." (Loomis, 2009) (Hodgson, 2010) NIOSH agreed with this re-assessment, "They [Hodgson & Darnton] found that cumulative risk of mesothelioma for chrysotile-exposed asbestos workers in processing plants was approximately an order of magnitude greater than the risk they had previously reported for mines and processing plants combined, and commented that this risk is still at least an order of magnitude lower than that associated with exposure to amphibole asbestos." (NIOSH, 2011) Furthermore, "Additional studies have updated the mortality experience of two of the chrysotile asbestos cohorts originally studied by Hodgson and Darnton but have not yet been addressed in a revised meta-analysis. Both of these studies have described additional mesothelioma deaths in their respective cohorts. These include (1) an update of the chrysotile miner cohort in Balangero, Italy, where 14 workers active in mine operations and an additional 13 other exposed individuals have developed malignant mesothelioma, and (2) an update of mesothelioma cases in the Connecticut friction product plant, where additional cases of malignant mesothelioma have been documented." (Markowitz, 2015) Thus, if their earlier finding was a risk of 0.001% mesotheliomas per fiber-years/cc, which was equated to 1 mesothelioma cases per 100,000 (10 per million) at 0.01 fiber-years/cc for chrysotile-only exposures, it stands to reason that under their new analysis which has increased the risk by an order of magnitude, the mesothelioma cases per million would also increase.

"Clinical and epidemiologic studies have established incontrovertibly that chrysotile causes cancer of the lung, malignant mesothelioma of the pleura and peritoneum, cancer of the larynx and certain gastrointestinal cancers. Chrysotile also causes asbestosis, a progressive fibrous disease of the lungs. Risk of these diseases increases with cumulative lifetime exposure to chrysotile and rises also with increasing time interval (latency) since first exposure. Comparative analyses have established that chrysotile is 2 to 4 times less potent than crocidolite asbestos in its ability to cause malignant mesothelioma, but of equal potency of causation of lung cancer. The International Agency for Research on Cancer of the World Health Organization has declared chrysotile asbestos a proven human carcinogen." (Landrigan, 1999)

"The case that chrysotile is a potent causative factor in producing mesothelioma is a strong one. It is shown to be so in a comparison of more than 40 studies of different fiber exposure circumstances. It is shown to be so when the time course of risk is considered in mixed fiber exposures. Finally, it is shown to be so in direct calculations of risk. All available data suggest that it dominates the risk in those

circumstances where it is the principal fiber used. The risk of chrysotile in producing mesothelioma is similar to that of amosite on a per fiber exposure basis. Crocidolite would appear to have a four to ten times greater potential to produce mesothelioma for equal exposure than chrysotile. However, the crocidolite risk is not so much greater that one can ascribe total causation to a small percentage of crocidolite fibers in a mixed fiber exposure setting." (Nicholson, 2001)

"This review sought to search the world epidemiology literature on mesothelioma to catalogue the case-series, cohort, and case-control studies in which the asbestos exposure appeared to be overwhelmingly to the chrysotile type. Mesothelioma is a rare cancer, but as illustrated … there have been cases in which chrysotile is the exclusive or overwhelming asbestos exposure from all over the world. Many members of the mainstream scientific community have concluded from the evidence that there is no 'safe' level of exposure to asbestos of any type. '…an occupational history of brief or low-level exposure should be considered sufficient for mesothelioma to be designated occupationally related…' to asbestos exposure." (Kanarek, 2011)

7. Conclusion

A. I have calculated that Mr. James LaFrentz had the following asbestos dose(s):

Name	Fiber-Years/cc
General Dynamics	**0.960**
3M	**0.960**

B. The above asbestos doses were calculated with the following criteria: GHP was asked to only review asbestos exposure at the General Dynamics work location.

C. The literature shows that exposures to mixed fibers or to Chrysotile alone, as reported above, show that Mr. LaFrentz had an increased risk for developing mesothelioma. It is my opinion that, regardless of whether the exposure is to a mixture of asbestos fiber types or to chrysotile alone, there is an increased risk of mesothelioma at cumulative exposure levels well below 1 fiber/cc-year.

D. In comparison to the relevant epidemiological studies or risk assessments, it is clear that these exposures more than doubled Mr. LaFrentz's risk of developing mesothelioma.

Based on my review of the case-specific information, Mr. James LaFrentz was exposed to asbestos during drilling and sanding activities with coupons/panels and subsequent debris cleanup.

My report and the opinions therein are based on the materials I have reviewed, my training, education, and experience as a Certified Industrial Hygienist, and the references cited herein. My opinions may be supplemented or changed if new evidence/information is presented to me.

Kenneth S. Garza, CIH, MS
VP Industrial Hygiene

TABLES

Table 1 - Mesothelioma Risk Assessments (Men) EPA/OSHA/MSHA

Source	Exposure [fiber/mL]	Year(s) [year]	Dose [fiber-year/mL]	Risk
ATSDR, 2001/McDonald, 1996/Hillerdal, 1999	0.0001 to 0.00000001 [medium 0.000001]	70	0.007 to 0.0000007 [medium 0.00007]	1-2 per million or less
EPA, 1986	0.0001	Starting the exposure at the age of 20 for 20-years.	0.002	0.4 per 100,000 [4 per million]
EPA, 1986	0.0001	70	0.007	1.9 per 100,000 [19 per million]
EPA, 1986	0.01	Starting the exposure at the age of 20 for 1-year	0.01	4.1 per 100,000 [41 per million]
OSHA, 1986; MSHA, 2008	0.1	Starting the exposure at the age of 25 for 1-year	0.1	6.9 per 100,000 [69 per million]
EPA, 1986	0.01	Starting the exposure at the age of 20 for 20-years	0.2	44.5 per 100,000 [445 per million]
EPA, 1986	0.01	Starting the exposure at the age of 20 for a 70-year lifetime or 50 years of exposure	0.5	51.7 per 100,000 [517 per million]
OSHA, 1986	0.1	Starting the exposure at the age of 25 for 20-years	2.0	73 per 100,000 [730 per million]
OSHA, 1986	0.1	Starting the exposure at the age of 25 for 45-years	4.5	82 per 100,000 [820 per million]

Table 2 - Low Dose and Odds Ratio

Source	Fiber-type	Fiber-years/mL	OR (Odds Ratio)
Iwatsubo - Pleural Mesothelioma...French Population - 1998	Not stated	0.001-0.49 0.5-0.99	1.2 (0.8-1.8) 4.2 (2.0-8.8)
Rodelsperger - Asbestos and Man Made... - 2001	Not stated	>0-0.15 >0.15-1.5	7.9 (2.1 - 30.0) 21.9 (5.7-83.8)
Rolland - Risk of pleural Mesothelioma…1998-2002 - 2006	Not stated	>0.0-0.07	2.8 (95% CI 1.7-4.7)
Lacourt - Occupational and Non-occupational...Mesothelioma - 2014	Not stated	<0.1	4.0 (1.9 to 8.3)
Ferrante - Occupational and non-occupational - 2015	Not stated	≥0.1-<1	4.4 (1.7 to 11.33) for all subjects. 3.8 (1.3 to 11.1) for non-occupational exposure.

Table 3 - Mesothelioma Risk Assessments (Men) EPA/OSHA with Hodgson & Darnton (2000)

Source	Exposure [fiber/mL]	Year(s) [year]	Dose [fiber-year/mL]	Risk
ATSDR, 2001/McDonald, 1996/Hillerdal, 1999	0.0001 to 0.00000001 [medium 0.000001]	70	0.007 to 0.0000007 [medium 0.00007]	1-2 per million or less
EPA, 1986	0.0001	Starting the exposure at the age of 20 for 20-years.	0.002	0.4 per 100,000 [4 per million]
Hodgson & Darnton (2000)[1]	N/A	N/A	0.005 f/ml.yr and lower	Crocidolite - "Best estimate about 10 deaths per 100 000 exposed [100 per million]." Amosite - "Best estimate about 2 deaths per 100 000 exposed [20 per million]." Chrysotile - "Insignificant"
EPA, 1986	0.0001	70	0.007	1.9 per 100,000 [19 per million]
Hodgson & Darnton (2000)[1]	N/A	N/A	0.01	Crocidolite - "Best estimate about 20 deaths per 100 000 [200 per million]" Amosite - "Best estimate about 3 deaths per 100 000 [30 per million]." Chrysotile - "Risk probably insignificant, highest arguable estimate 1 deaths per 100 000 exposed [10 per million]."
EPA, 1986	0.01	Starting the exposure at the age of 20 for 1-year.	0.01	4.1 per 100,000 [41 per million]
Hodgson & Darnton (2000)[1]	N/A	N/A	0.1	Crocidolite - "Best estimate about 100 deaths per 100 000 exposed [1,000 per million]." Amosite - "Best estimate about 15 deaths per 100 000 exposed [150 per million]."

Table 3 - Mesothelioma Risk Assessments (Men) EPA/OSHA with Hodgson & Darnton (2000)

				Chrysotile - "Risk probably insignificant, highest arguable estimate 4 deaths per 100 000 exposed [40 per million]."
OSHA, 1986	0.1	Starting the exposure at the age of 25 for 1-year.	0.1	6.9 per 100,000 [69 per million]
EPA, 1986	0.01	Starting the exposure at the age of 20 for 20-years.	0.2	44.5 per 100,000 [445 per million]
EPA, 1986	0.01	Starting the exposure at the age of 20 for a 70-year lifetime or 50 years of exposure.	0.5	51.7 per 100,000 [517 per million]
Hodgson & Darnton (2000)[1]	N/A	N/A	1.0	Crocidolite - "Best estimate about 650 deaths per 100 000 exposed [6,500 per million]." Amosite - "Best estimate about 90 deaths per 100 000 exposed [900 per million]." Chrysotile - "Best estimate about 5 deaths per 100 000 exposed [50 per million]."
OSHA, 1986	0.1	Starting the exposure at the age of 25 for 20-years	2.0	73 per 100,000 [730 per million]
OSHA, 1986	0.1	Starting the exposure at the age of 25 for 45-years	4.5	82 per 100,000 [820 per million]

[1]This does not include the re-evaluation of the Loomis results discussed in Hodgson & Darnton, 2010 or additional results as discussed in Markowitz, 2015.

APPENDIX A

James LaFrentz Asbestos Dose Report Literature References

1. Introduction

No documents included.

2. Dose Calculation

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"GD Sampling Doc[13728]"

"LaFrentz - Emory Report"

"LaFrentzJam111418asb"

"LaFrentzJam111518asbV2"

"bevis-6-5-18-FULL"

APPENDIX B

	A	B
1	**Name**	**Fiber-Years/cc**
2	**General Dynamics**	**0.960**
3	**3M**	**0.960**

General Dynamics-3M

	A	B	C	D	E
1	General Dynamics/3M				
2					
3					
4	Use	Total fiber/cc-years per site	Description	Mulitplying Factor	Total fiber/cc-years for Brand
5					
6	**General Dynamics (1979-1981 or 1982)**	4.800	Mr. LaFrentz wore a dust mask during coupon or panel drilling, and cleanup work, “[a] dust mask, but it didn't completely take it out because I always had to go wash my face” (Vol. I, Pg. 73, 78, 80-81, 90). He always wore a dust mask when he had a bin of coupons or panels to work with (Vol. I, Pg. 81). He recalls other employees complaining about the dust and smell produced from coupon or panel work activities. He does not recall these co-workers wearing a dust mask when Mr. LaFrentz performed his coupon or panel work (Vol. I, Pg. 75, 88). Mr. LaFrentz recalls the mask box had “3M dust protector … [model or style number] 8710”, and he only wore this mask brand and model (Vol. I, Pg. 78) (Vol. II, Pg. 104). “It [the paper mask] was kind of whitish-gray with yellow bands on it … run across your nose” (Vol. I, Pg. 79). "Q...And in that paper he reported that he believed the 8710 had a protection factor of five. Do you recall that? A. That's right. Q. And then I think even today you agree – you would say -- A. Yes. Q. -- today -- A. As well as NIOSH. Q. Yeah. But you would say it had a protection factor of five. A. That's correct." (Pg. 49-50, Bevis Deposition, 060518) *[=1/5]*	0.20000	0.960
7					
8	*italics* font- GHP assumptions; normal font - from depositions		**GRAND TOTAL FIBER/CC-YEARS FOR MANUFACTURER**		0.960

	A	B	C	D	E	F	G	H	I
		Task (Personal)	**Frequency Description (Personal)**	**Frequency**	**Duration Description (Personal)**	**Duration (Hours)**	**Concentration (f/cc)**	**Years**	**Fiber-Year/cc**
1	**General Dynamics (1979-1981 or 1982)**								
2	Mr. LaFrentz worked for General Dynamics, from 1978 or 1979 to 2005, probably in 1979 in January (Vol. I, Pg. 54-55, 121-122). General Dynamic was located on the runway of Carswell Air Force Base, "I'd heard they were hiring buildup for the F-16"; "Air Force Plant Number 4" (Vol. I, Pg. 55, 115-116, 127). Lockheed later bought out General Dynamics (Vol. I, Pg. 98, 113-114). They were manufacturing F-16 aircraft at this General Dynamics plant in Fort Worth, Texas (Vol. I, Pg. 57). Also, they were "…finishing up on the last F-111s … and going into production on the F-16" (Vol. I, Pg. 58, 116-117) (Vol. II, Pg. 52-53). Aircraft was assembled in Air Force Plant Number 4 (Vol. I, Pg. 116). His first position onsite was as a "…drill press operator in the … parts fab department" from 1979 to 1981 or 1982, or 3 years (Vol. I, Pg. 58-59, 82) (Vol. II, Pg. 146-147). He worked with 30-40 co-workers in this area (Vol. I, Pg. 59) (Vol. II, Pg. 150). Coupons, panels, honeycomb and strips are all one and the same. He believes these items consisted of "[s]ome kind of bonding surface, I guess, because they were trying to test the strength of it" (Vol. I, Pg. 131) (Vol. II, Pg. 114, 147).	**[P] Coupon Drilling -** Regarding the coupon or panel drilling work, "I -- varied times I might have a – they would bring them out in a plastic bin … And there may be 20 or 30 or so in that bin. I might have to do this for two days. I might have -- not have another bin come out for a month" (Vol. I, Pg. 65, 68) (Vol. II, Pg. 157). Mr. LaFrentz did this coupon or panel work off and on for "[a] little over three years probably" while he was a drill press operator and in no other position later (Vol. I, Pg. 66, 129) (Vol. II, Pg. 158). He only did this type of coupon drilling work as a drill press operator (Vol. I, Pg. 66). He drilled all the way through the coupons or panels (Vol. II, Pg. 164-165). Honeycomb panels and regular panels required 4 drill holes; strip panels required two holes (Vol. II, Pg. 114-116). Regarding dust produced during drilling, "[y]es, very much so. Very, very dusty because I could not use any kind of solution on this -- these test panels … I saw it with my own eyes and I had to wipe it off my own face … Smelled like something was burning up. Stunk very bad" (Vol. I, Pg. 69-70) (Vol. II, Pg. 106, 166-167).	"I would have to say that over a three-year period, maybe a thousand of them [panels that he drilled] … I know there was quite a few"; "I would have to -- I don't – I didn't keep a count of it, but I'd have to say over the period -- that three-year or so period, that I probably drilled a thousand or more panels … A thousand or more panels. Panels, coupons, whatever you want to call them"; "at least" a thousand panels; "I know I did tons of them" (Vol. I, Pg. 67) (Vol. II, Pg. 113, 165-166). *[=1000/3]*	333	Drilling two holes in a single strip, plus "cleanup" could take 30-45 minutes, from start to finish (Vol. I, Pg. 66). From start to finish, to drill and to sand a strip panel, it took 20-30 minutes. From start to finish, to drill and to sand a metal panel, it took 30-40 minutes. From start to finish, to drill and to sand a honeycomb panel, it took 15-20 minutes (Vol. II, Pg. 168). *GHP Estimates Drilling+Sanding Average - Sanding Average or [=(((15+20+20+30+30+30+40+45)/8)/60)-(((15+25)/2)/60)*	0.15	No Information	3	Not Calculated
3		**[P] Coupon Sanding -** After drilling work, Mr. LaFrentz used a belt sander, "[t]hey were always leaving, like, burrs around the hole [from the drilling] and the engineers wanted them smooth so they could test them, put them on the pegs. So I would have to take and either use the little belt sander we had there to kind of run over it or use the air hand sander. Had a little disc pad on the end of it … And sometimes I used the whirligig … That's just a little handle that you whipped around and around inside the hole that --"; "I used a small, like, one inch belt sander on occasions. If it was really burry and all, I would use a hand drill, air powered with a right angle on it and a two-inch disc to clean it up, and then the final step was to take a whirly-gig and run it inside of it to clean up all the edges" (Vol. I, Pg. 70) (Vol. II, Pg. 116-117, 157, 167). Regarding dust produced from sanding and finishing the panels or coupons, "It stunk and created a lot of dust", and this dust was visible. He breathed this dust (Vol. I, Pg. 71) (Vol. II, Pg. 168).	"I would have to say that over a three-year period, maybe a thousand of them [panels that he drilled] … I know there was quite a few"; "I would have to -- I don't – I didn't keep a count of it, but I'd have to say over the period -- that three-year or so period, that I probably drilled a thousand or more panels … A thousand or more panels. Panels, coupons, whatever you want to call them"; "at least" a thousand panels; "I know I did tons of them" (Vol. I, Pg. 67) (Vol. II, Pg. 113, 165-166). *[=1000/3]*	333	Sanding most panels would take 15-25 minutes (Vol. II, Pg. 118). From start to finish, to drill and to sand a strip panel, it took 20-30 minutes. From start to finish, to drill and to sand a metal panel, it took 30-40 minutes. From start to finish, to drill and to sand a honeycomb panel, it took 15-20 minutes (Vol. II, Pg. 168). *[=((15+25)/2)/60]*	0.33	28.80	3	4.800
4		**[P] Coupon Debris Cleanup -** Mr. LaFrentz would have a "massive cleanup" after his coupon or panel drilling work (Vol. I, Pg. 74). "After I got through the -- with the complete job that was in that little plastic bin, eight, ten, 12, 14 parts, something like that, after I cleaned them all up and everything I took that bin and walked it over to the finished rack and then went back and proceeded to clean up the fixture so I could go put it away and clean up my worktable and the floor around it" (Vol. II, Pg. 118-119). "Well, I would have to turn around and get a -- kind of a desk brush. A long-handled brush about that long and brush all my desk off and brush the fixture off and then sweep up the floor and clean it up, and then on occasion some of the stuff would be stuck in the fixture so I'd have to get the air hose out and blow the air hose over the fixture to clean it up" (Vol. I, Pg. 88). Regarding the dust produced from cleanup, "[i]t stirred up the dust a little bit", and this dust was visible; visible dust was also produced during the use of compressed air (Vol. I, Pg. 89).	"I would have to say that over a three-year period, maybe a thousand of them [panels that he drilled] … I know there was quite a few"; "I would have to -- I don't – I didn't keep a count of it, but I'd have to say over the period -- that three-year or so period, that I probably drilled a thousand or more panels … A thousand or more panels. Panels, coupons, whatever you want to call them"; "at least" a thousand panels; "I know I did tons of them" (Vol. I, Pg. 67) (Vol. II, Pg. 113, 165-166). *[=1000/3]*	333	It could take Mr. LaFrentz 30 minutes to an hour to cleanup his work areas after panel work, depending on how many panels he worked with (Vol. II, Pg. 119). *[=((30+60)/2)/60]*	0.75	No Information	3	Not Calculated
5								Total	4.800
6									

	A	B	C	D	E	F
	ACM Type	**Task**	**n**	**f/cc**	**Description**	**Source**
1	**Coupons/**	**Drilling**	**Total n**			
2	**Panels**		**1**			
3			1	28.800	General Dynamics, Ft. Worth; drilling conducted by J.B. LaFrentz; Parts Fabrication and Finish; Belt Sanding P-653 Panels; "FMS 3018 is used in adhesive of P653 Panels"; Contaminant(s) Asbestos; 1 minute sampling time; Sample # 80-74; "During sampling employee wore a disposable repsirator approved for use in the asbestos contaminated atmosphere"	Hallstein, 1980
4						
5			**Average**	**28.800**		
6						

APPENDIX C

GHP ENVIRONMENTAL + ARCHITECTURE

KENNETH S. GARZA, CIH, MS
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EDUCATION:
Bachelor of Science in Biology, Minor in Chemistry, St. Mary's University, San Antonio, 2001
Master of Science in the Environmental Science and Management, University of Texas at San Antonio, 2006

LICENSES AND CERTIFICATIONS:
Certified Industrial Hygienist, #10082; Texas Licensed Asbestos Consultant, #105702; Florida Licensed Asbestos Consultant, #AX108; Texas Licensed Mold Assessment Consultant, #MAC0379

PROFESSIONAL SUMMARY:
Mr. Garza has over seventeen years of experience in various aspects of the environmental industry which include:

Conducted/Managed numerous inspections for the determination of asbestos-containing materials, and the development of abatement protocols for the removal of asbestos-containing materials, asbestos dose reconstruction.

Conducted/Managed numerous microbial investigations with an emphasis on causation. In addition, he has conducted/managed numerous visual inspections for the purpose of developing Microbial Remediation Plans, as well as the composition of those plans. Conducted/Managed numerous remediation projects from the selection of the contractor to the receipt of satisfactory post remediation samples and closeout reports. Conducted/Managed Legionella sampling and evaluation.

Conducted/Managed classic Industrial Hygiene (IH) work for purpose of assessing potentially harmful agents to occupants in the residential and occupational settings. These agents include, but are not limited to, formaldehyde, xylene, respirable dust, carbon black (soot), fly-ash, volatile organic compounds (VOC's), nicotine residue, pesticides, inorganic acids, sodium hydroxide, trichloroethylene, chromic acid, and ammonia. Literature research related to environmental and industrial hygiene issues.

Client Base: Healthcare, Hospitality and Insurance Industries; School Systems, Commercial and Residential Properties, Law Firms.

MEMBERSHIPS:
Alamo Chapter, Air and Waste Management Association, 2004-2009, 2012
Texas Association of Health Care Facilities Management, 2007-2009
North Chamber of Commerce, San Antonio, 2009
American Industrial Hygiene Association, 2009-2020
American Board of Industrial Hygiene, 2012-2020

PUBLICATIONS:
Garza, Kenneth S. & Lannan, Robert. "Toxic Mold Litigation: Perspectives on Excessive Mold Growth in Hotels." Hotel Business Review, Best Practices in Hotel Management & Operations; December 8, 2019.

Garza, Kenneth S. "The Use of Blue Crocidolite in a 'Salt Cake' Plant." The Official Newsletter of the Environmental Information Association (EIA); Volume 11, Issue 3, May/June 2012.

APPENDIX D

Testimony/Deposition Experience Since 2009 (Updated June 11, 2020) – Kenneth S. Garza

Client or Attorney & Location	Case Number	Names of Parties	Where Case was Filed	Deposition	Trial	GHP Project Number
Law Offices of Pries & Roy, PLC.	Civil Action No. 4:08-CV-03340	Doctor's Hospital 1997, L.P., et al. v. Beazley Insurance Co., Inc.	The United States District Court for the Southern District of Texas Houston Division	Yes July 1, 2009	Yes February 17, 2010	08214.00
Law Office of Simon Eddins & Greenstone, LLP.	Cause No. 2008 - 58697	Roy Legget and Wanda Legget v. Bondex International, Inc., et al.	District Court, Harris County, Texas, 11th Judicial District	Yes April 14, 2009	None	07079.06
Law Offices of Paul A. Weykamp	Civil Action No. MDL 875	Jessie Leonard v. AC&S, Inc., et al.	Eastern District of Pennsylvania	Yes March 8, 2011	None	10307.00
Law Offices of Paul A. Weykamp	Civil Action No. MDL 875	Charles King v. AMCHEM, Inc., et al.	Eastern District of Pennsylvania	Yes March 8, 2011	None	10307.01
Law Offices of Paul A. Weykamp	Civil Action No. MDL 875	Jimmie Dale Davis v. AMCHEM, Inc., et al.	Eastern District of Pennsylvania	Yes March 8, 2011	None	10307.02
Law Offices of Paul A. Weykamp	Civil Action No. MDL 875	Raymond Stevens v. AMCHEM, Inc., et al.	Eastern District of Virginia, Newport News Division	Yes March 8, 2011	None	10307.03
Law Offices of Paul A. Weykamp	Civil Action No. MDL 875	Robert Jacobs v. AC&S, Inc., et al.	Eastern District of Pennsylvania	Yes March 8, 2011	None	10307.04
Law Offices of Paul A. Weykamp	Civil Action No. MDL 875	Lawrence G. Parham v. AC&S, Inc., et al.	Eastern District of Pennsylvania	Yes March 8, 2011	None	10307.05
Law Offices of Paul A. Weykamp	Civil Action No. MDL 875	Phillip E. Holmes v. AC&S, Inc., et al.	Eastern District of Pennsylvania	Yes March 8, 2011	None	10307.06

Client or Attorney & Location	Case Number	Names of Parties	Where Case was Filed	Deposition	Trial	GHP Project Number
Cascino Vaughan Law Offices	MDL Docket No. MDL 875	Anderson v. Bechtel Corporation, et al.	United States District Court for the Eastern District of Pennsylvania	Yes December 12-13, 2011	Pending	11266.01
Morgan & Morgan, LLC	C.A. No. 11C-02-034 ASB	Donald Strefling, Barbara Strefling v. Advanced Auto Parts, et al.	The Superior Court of the State of Delaware in and for New Castle County	Yes July 24, 2012	None	10303.06
Morgan & Morgan, LLC	Civil Action No. 03-C-9600	Patricia D. Little, et al. v. A.O. Smith Corporation, et al.	Circuit Court of Kanawha County, West Virginia	Yes January 15, 2013	None	10303.07
Morgan & Morgan, LLC	Civil Action No. 12-C-922 KAN	Ellen Thompson, et al. v. A.O. Smith Corporation, et al.	Circuit Court of Kanawha County, West Virginia	Yes January 15, 2013	None	10303.08
Waters, Kraus & Paul	No. 112CV220636	Raymon R. Uribes and Elia B. Uribes v. 3M Company, et al.	The Superior Court of the State of California in and for the County of Santa Clara	Yes April 17, June 2-3, 7-8, 2013 Hearing – June 12-13, 2013	Yes June 24-25, 2013	12294.02
Waters, Kraus & Paul	Case No. BC 481 282	Michael Sherman v. BASF Catalyst LLC, et al.	Superior Court of the State of California for the County of Los Angeles	Yes August 23, 29, 2013	None	12294.04
Waters, Kraus & Paul	Case No. RG12659674	John J. Depree v. BASF Catalysts LLC., et al.	Superior Court of the State of California for the County of Alameda	Yes October 4, 2013	Pending	12294.05
Morgan & Morgan, LLC	Case No. 2012 CA 005489 A	David Lloyd Snavely v. 3M Company, et al.	Superior Court of the District of Columbia	Yes November 21, 2013	Pending	13030.12

Client or Attorney & Location	Case Number	Names of Parties	Where Case was Filed	Deposition	Trial	GHP Project Number
Chandler McNulty, LLP	Cause No. 2013-13447-MDL	Jones v. The Goodyear Tire & Rubber Co. et al.	District Court, Harris County, MDL Asbestos Court	Yes December 10, 2013	Pending	13170.00
Morgan & Morgan, LLC	Case No. 24-X-12-000433	Richard Martin Czapp, et al. v. AC&R Insulation Co., et al.	In the Circuit Court of Baltimore City	Yes January 21, 2014	Pending	10303.11
Waters, Kraus & Paul	Case No. JCCP4674	Mavis G. Manuel v. BASF Catalysts, LLC, et al.	Superior Court of the State of California, For the County of Los Angeles	Yes March 3, 2014	Pending	12294.00
Weitz & Luxenberg	No. BC519273, No. JCCP4674	Nader Kordestani, et al. v. 3M Company, et al.	Superior Court in the State of California, County of Los Angeles	Yes March 24-25, 2014	None	13220.01
Dubose Law Firm	Case No. 13-L-1767	Byron Nelson, et al. v. Air & Liquid Systems Corp., et al.	In the Circuit Court of the Third Judicial, Circuit Madison County, IL.	Yes April 10, 2014	None	12345.06
Gori Julian & Associates, P.C.	Case No. 12-L-1291	James C. Miller v. Alcatel-Lucent USA, Inc., et al.	In the Circuit Court, Third Judicial Circuit, Madison County, Illinois	Yes June 25, 2014	None	14034.00
The Lanier Law Firm	No. 617926	Freddie Loden v. The McCarthy Corporation, et al.	19th Judicial District Court for the Parish of East Baton Rouge, State of LA	Yes September 5, 2014	Pending	14033.00
Weitz & Luxenberg	Case No. RG14718404	Robert Adams v. Asbestos Corporation Limited, et al.	Superior Court of the State of California, For the County of Alameda	Yes October 27, 31, 2014	Yes November 25, 2014 & December 1, 2014	13220.04

Client or Attorney & Location	Case Number	Names of Parties	Where Case was Filed	Deposition	Trial	GHP Project Number
Weitz & Luxenberg	Case No. 2:14-CV-04977-R-PJW	Howard & Joann Utech v. Asbestos Corporation Ltd., et al.	United States District Court, Central District of California	Yes April 3, 2015	Yes February 9, 2017	13220.07
Law Office of Simon, Greenstone, Panatier, Bartlett, PC.	Civil Action No. 14-C-1371 KAN	Patsy R. Arbaugh, et al. v. 3M Company, et al.	In the Circuit Court of Kanawha County, West Virginia	Yes June 3, 2015	None	14293.16
Weitz & Luxenberg	Case No. RG13664264	Shirley Espino (SUC/WD; Alfred) v. BorgWarner Corporation, et al.	In the Superior Court of the State of California in and for the County of Alameda	Yes June 15, 2015	None	13220.08
Karst & Van Oiste, LLP.	190201/2012	Linda Vellucci and Estate of John Vellucci v. Borg-Warner Corp.	Supreme Court of the State of New York, county of New York	Yes June 25, 2015	None	13189.19
Karst & Van Oiste, LLP.	190087/2014	Walter Miller v. ATK Launch Systems Group	Supreme Court of the State of New York, county of New York	Yes June 25, 2015	Yes September 17, 2015	13189.18
Patten, Wornom, Hatten & Diamonstein, L.C.	Case No. CL14-01383P-03	Earl W. Chapman v. John Crane Inc., et al.	Virginia: In the Circuit Court for the City of Newport News	Yes July 21, 2015	None	12272.04
Martzell & Bickford	Case No. 13-8497	Jerry Cambre v. Huntington Ingalls, Inc., et al.	Civil District Court for the Parish of Orleans, State of Louisiana	Yes October 6, 2015	Pending	08139.35

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Client or Attorney & Location	Case Number	Names of Parties	Where Case was Filed	Deposition	Trial	GHP Project Number
Weitz & Luxenberg	Case No. BC580695	Farid Malek v. Blackmer Pump, et al.	Superior Court of the State of California in and for the County of Los Angeles	Yes November 10, 2015	Yes January 26-27, 2016	13220.12
Karst & Van Oiste, LLP	Case 14-2-08075-1 SEA	Patrick Hickey and Vickie Hickey vs. American Biltrite, Inc.; et al.	Superior Court of Washington for King County	Yes January 4, 2016	Pending	13189.16
Karst & Van Oiste, LLP	Case No. BC516879	Jackie S. Hammond, et al., v. Asbestos Corporation Limited, et al.	Superior Court of the State of California For the County of Los Angeles	Yes February 16, 2016	Yes April 18, 2016	13189.14
Martzell & Bickford	No. 13-12146	Leroy Henry v. Cooper/T. Smith Stevedoring Company, Inc., et al.	Civil District Court for Parish of New Orleans, State of Louisiana	Yes March 10, 2016	Pending	08139.41
Scheuermann & Jones, LLC; Martzell & Bickford	Case No. 2014-8969	Frank S. Romano, Sr. and Lynne Rome Romano v. Metropolitan Life Insurance Company, et al.	Civil District Court of Parish of Orleans, State of Louisiana	Yes February 22, 2016 & March 14, 2016	Yes March 18, 2016	15210.01
Bailey Peavy Bailey	Case No. 13 L 1445	Wanda Evers v. A.W. Chesterton Company, et al.	Circuit Court of Third Judicial Circuit Madison County, Illinois	Yes April 9, 2016	Pending	15338.05
Morgan & Morgan, LLC	Case No. 24X15000796	Robert E. Ludlow, Sr., and vs. 3M Company, et al.	In the Circuit Court for Baltimore City	Yes May 16, 2016	Pending	10303.14

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Client or Attorney & Location	Case Number	Names of Parties	Where Case was Filed	Deposition	Trial	GHP Project Number
Martzell, Bickford & Centola, A.P.C.	Case No. 14-11125	Barbara Falgout Matherne, et al., v. Huntington Ingalls Incorporated, et al.	Civil District Court for the Parish of Orleans, State of Louisiana	Yes June 1, 2016	Pending	08139.50
Heard Robins Cloud, LLP	Docket No. 629, 539	Dorthy Monk Standley, et al. v. Continental Can Company, et al.	19th Judicial District Court for the Parish of East Baton Rouge, State of Louisiana	Yes June 6, 2016	No	15174.03
Simmons Hanly Conroy L.L.P	Case Nos. JCCP4647 BC602346	Louis Lowell et al., v. ABB INC., et al.	Superior Court of the State of California, County of Los Angeles	Yes July 19, 2016 & August 1, 2016	Pending	12320.13
Martzell, Bickford & Centola, A.P.C.	Docket No. 740-833	Timothy Boyd, et al. v. Burmaster Land Development Company, LLC, et al.	24th Judicial District Court for the Parish of Jefferson, State of Louisiana	Yes July 27, 2016	Pending	08139.52
Martzell, Bickford & Centola, A.P.C.	Case No. 2015-2883 C/W 2015-00877	Michelle Talbot Rogers v. Huntington Ingalls Incorporated, et al.	Civil District Court for the Parish of Orleans, State of Louisiana	Yes August 15, 2016	Pending	08139.51
Dean, Omar & Branham, LLP	Case No. 2015-3732	Thomas H. Hayden, et al. v. 3M Company, et al.	Civil District Court for the Parish of Orleans, State of Louisiana	Yes August 17, 19, & September 12, 2016	Pending	15182.03
Karst & Von Oiste, LLP	Case No. 1:14-CV-13000-RGS	Richard Shaw, et al. v. Warren Pumps LLC, et al.	United District Court for the District of Massachusetts	Yes August 18, 2016	Pending	13189.22

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Client or Attorney & Location	Case Number	Names of Parties	Where Case was Filed	Deposition	Trial	GHP Project Number
Law Office of Simon, Greenstone, Panatier, Bartlett, PC.	Case No. 2014-53830	Thomas John Prezioso, et al. v. Cyprus Amax Minerals Company, et al.	11th Judicial District Court of Harris County, Texas	Yes August 22, 2016	Pending	14293.21
Landry & Swarr, LLC	Case No. 2:16-CV-00308	David W. Colletti v. Bendix, et al.	United District Court Eastern District of Louisiana	Yes August 23, 2016	Pending	15368.02
Martzell, Bickford & Centola, A.P.C.	Case No. 2014-4295	Robert Jean Oddo Sr. v. Taylor-Seidenbach, Inc., et al.	Civil District Court, Parish of Orleans, State of Louisiana	Yes September 15, 2016	Pending	08139.39
Martzell, Bickford & Centola, A.P.C.	Case No. 2000-14332	Water J. Hotard v. A.P. Green Industries, Inc., et al.	Civil District Court, Parish of Orleans, State of Louisiana	Yes September 16, 2016	No	08139.38
Weitz & Luxenberg	Case No. JCCP4674/BC615188	Melvin Jones v. Borg Warner Morse TEC, et al.	Central Civil West LAOST Asbestos Cases Court of the County of Los Angeles, State of California	Yes September 20, 2016	Yes October 26, 2016	13220.13
Law Office of Simon, Greenstone, Panatier, Bartlett, PC.	Case No. 2011-27191-ASB	Bryan V. Holman, et al. v. Alcoa, Inc., et al.	11th Judicial District Court of Harris County, Texas	Yes September 23 & October 21, 2016	Pending	07079.61
Bailey Peavy Bailey Cowan Heckaman	Case No. 14-L-676	Gregory Guerrero, et al. v. American Optical Corporation, et al.	Circuit Court of Third Judicial Circuit Madison County, Illinois	Yes October 3, 2016	Pending	15338.06

Client or Attorney & Location	Case Number	Names of Parties	Where Case was Filed	Deposition	Trial	GHP Project Number
DuBose Law Firm	Case No. D140327-C	Judy Wayne Peabody/Ryan, et al. v. Able Supply Company, et al.	11th Judicial District Court of Harris County, Texas	Yes October 6, 2016	Pending	12345.17
Simmons Hanly Conroy L.L.P	Case No. 15-L-1288	Gerald David Green/Nahoko v. A.W. Chesterton Company, et al.	Circuit Court of the Third Judicial Circuit Madison County, Illinois	Yes October 24, 2016	Pending	12320.18
Valles Law Firm PLLC	Case No. 1522-CC10653	William Ferrell Jr., et al. v AEDC Public Affairs, et. al	Circuit Court State of Missouri Twenty-second Judicial Circuit	Yes November 2, 2016	Pending	16018.01
Law Office of Simon, Greenstone, Panatier, Bartlett, PC	Case No. 2014-52886	Richard A. Hawk v. BNSF Railway Company, et al.	District Court 17th Judicial District Tarrant County, Texas	Yes November 9 & February 17, 2016	Pending	14293.33
Black Law Group, PLLC	Case No. 1422-CC09407	Yolanda Sample, et al. v. American Biltrite, Inc. et.al.	Circuit Court of the City of St. Louis State Missouri	Yes November 11, 2016	Pending	16108.01
Simmons Hanly Conroy, LLC	Case No. 15-L-513	Carol Cote, et al. v. A.W. Chesterton Company, et al.	Circuit Court Third Judicial Circuit Madison County Illinois	Yes November 14, 2016	Pending	12320.19
Simmons Hanly Conroy, LLC	Case No. 1522-CC01036	Susan Highfill v. Allied Manufacturing Co, et al.	Circuit Court State of Missouri Twenty-second Judicial Circuit	Yes November 14, 2016	Pending	12320.19
Dean, Omar and Branham, LLP	Case No. 2016-CP-00849	Sebastian Paterniti, et al. v. Asbestos Corporation LTD, et al.	Court of the Common Pleas for the Fifth Judicial Circuit County of Richland, South Carolina	Yes November 16, 2016	Pending	15182.05

Client or Attorney & Location	Case Number	Names of Parties	Where Case was Filed	Deposition	Trial	GHP Project Number
Law Office of Simon, Greenstone, Panatier, Bartlett, PC	Cause No. CC-14-01246-A	Don L. Thomison and Angela Thomison v. Borg-Warner Morses Tec Inc.	11th Judicial District Court of Harris County, Texas	Yes December 8, 2016	Pending	14293.36
Law Office of Simon, Greenstone, Panatier, Bartlett, PC	Cause No. 2014-02782	Garland Dale Pepper v. ABB, Inc. et al.	11th Judicial District Court of Harris County, Texas	Yes December 14, 2016	Pending	07079.84
Law Office of Simon, Greenstone, Panatier, Bartlett, PC	Cause No. 2013-69551	Martin Banda v. DAP Products, Inc., et al.	11th Judicial District Court of Harris County, Texas	Yes January 3, 2017	Pending	14293.42
Simmons Hanly Conroy, LLC	No. 1622-CC00071	Vincent Otten v. A.W. Chesterton Company, Inc., et al.	Circuit Court for the State of Missouri Twenty-Second Judicial Circuit	Yes January 9, 2017	No, settled	12320.15
Martzell, Bickford & Centola, A.P.C.	Docket No. 2015-31636	Clarence P. Gallien, Jr. v. Huntington Ingalls Industries, Inc., et al.	Civil District Court for the Parish of Orleans State of Louisiana	Yes January 13, 2017	Pending	08139.56
Law Office of Simon, Greenstone, Panatier, Bartlett, PC	Cause No. CC-14-05593-B	Robert Elmer McCartney and Roberta McCartney v. ASCO Valve, Inc. et al.	11th Judicial District Court of Harris County, Texas	Yes January 19, 2017	Pending	14293.23
Law Office of Simon, Greenstone, Panatier, Bartlett, PC	C.A. No. N14C-02-152 ASB	Leon Holman v. Armstrong Int'l, Inc., et al.	Superior Court of the State of Delaware in and for New Castle County	Yes January 31, 2017	Pending	14293.27
The Law Offices of Peter G. Angelos, P.C.	Case No. 24X15000318	Raymond Greenhill v. ACands, Inc., et al. [Case Affected: Concetta Schatz]	Circuit Court for Baltimore City	Yes February 1, 2017	Pending	14248.05

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Client or Attorney & Location	Case Number	Names of Parties	Where Case was Filed	Deposition	Trial	GHP Project Number
Valles Law Firm PLLC	No. 14-L-1505	Nellie Taylor…Alton Taylor v. 4520 Corp., Inc, et al.	Circuit Court Third Judicial Circuit Madison County, Illinois	Yes February 6, 2017	Pending	16018.04
Law Office of Simon, Greenstone, Panatier, Bartlett, PC	Cause No. 2012-38123	Billy H. Dickson v. Guard-Line, Inc., et al.	District Court of Harris County, 11th Judicial District in the District Court of Dallas County	Yes February 17, 2017	Pending	07079.64
Weitz & Luxenberg	Case No. BC635249	Arlin Anderson vs. Air & Liquid Systems Corporation, et al.	Superior Court of the State of California for the County of Los Angeles	Yes March 28, 2017	Yes April 26-27, 2017	13220.15
Dean, Omar and Branham, LLP	C/A No. 2016-CP-40-06351	David Lamar Taylor vs. 3M Company f/k/a Minnesota Mining and Manufacturing, et al.	Court of Common Pleas: State of South Carolina for the Fifth Judicial Circuit County of Richland	Yes March 31 & May 4, 2017	Pending	15182.07
Martzell, Bickford & Centola, A.P.C.	No. 16-3579	James Becnel	Civil District Court for the Parish of Orleans State of Louisiana	Yes April 4, 2017	Pending	08139.53
SWMK Law, LLC	Case No. 1622-CC09651	Terrance Hardaway vs. 84 Lumber, et al.	State of Missouri in the Twenty Second Judicial Court St. Louis Missouri	Yes April 7 , 2017	Pending	14078.05
Law Office of Simon, Greenstone, Panatier, Bartlett, PC	Case No. 15 CV 373	Patrica Carroll vs. ABB, Inc., et al.	In the United States District Court, Western District of Wisconsin	Yes May 25, 2017	Pending	14293.58

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Client or Attorney & Location	Case Number	Names of Parties	Where Case was Filed	Deposition	Trial	GHP Project Number
Martzell, Bickford & Centola, A.P.C.	No. 2014-3195	Rudolph Narcisse vs. Huntington Ingalls Incorporated, et al.	Civil District Court for the Parish of Orleans, State of Louisiana	Yes June 9, 2017	Pending	08139.58
Dean, Omar and Branham, LLP	Case No. 16-2-18554-1 SEA	Philip Carl Unick vs. 3M Company, et al.	The Superior Court of the State of Washington in and for the County of King	Yes June 22, 2017	Pending	15182.11
Dean, Omar and Branham, LLP	Civil Action No. 1:15-CV-130	Dale Jolly/Edward McSwain vs. Air & Liquid Systems Corporation, et al.	United States District Court for the Western District of North Carolina	Yes July 6, 2017	Pending	15182.06; 15182.13
Dubose Law Firm	No. 2013-2388	Elizabeth Gailyne Sutherland vs. Alma Plantation, LLC, et al.	Civil District Court for the Parish of Orleans, State of Louisiana	Yes July 14, 2017	Pending	12345.08
Law Office of Simon, Greenstone, Panatier, Bartlett, PC	Cause No. 2015-60651	Arthur Thomas Ward, Deceased, and Virginia Sue Ward vs. Ashcraft Company, Inc., et al.	District Court of Harris County, Texas, Asbestos MDL Court	Yes July 31, 2017	Pending	14293.37
Weitz & Luxenberg	Case No. JCCP 4674/BC519273	Nader Kordestani and Sherry Kordestani vs. 3M Company, et al.	Superior Court of the State of California for the County of Los Angeles	Yes March 21, 2014	Yes August 10, 2017	13220.01

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Client or Attorney & Location	Case Number	Names of Parties	Where Case was Filed	Deposition	Trial	GHP Project Number
Cascino Vaughan Law Offices	Case No. 10-CV-156-PP, 13-CV-1456-CNC	Daniel Ahnert, Deceased, and Beverly Ahnert vs. Employers Insurance Company of Wausau, et al.	United States District Court for the Eastern District of Wisconsin, Milwaukee Division	Yes August 11, 2017	Pending	11266.55
Law Office of Simon, Greenstone, Panatier, Bartlett, PC	Cause No. CC-14-02693-B	Walter R. Clements et al. vs. Asco Valve, Inc., et al.	District Court of Harris County, Texas, 11th Judicial District	Yes August 16, 2017	Pending	14293.28
Law Office of Simon, Greenstone, Panatier, Bartlett, PC	Cause No. 2016-02488-ABS	Kenneth E. Phipps, et al. vs. CBS Corporation, et al.	District Court of Harris County, Texas, 11th Judicial District	Yes August 17, 2017	Pending	14293.51
Gori Julian & Associates, P.C.	Case No. 16-L-286	Bernard Kunes vs. A.O. Smith Corporation, et al.	Circuit Court, Third Judicial Circuit, Madison County, Illinois	Yes August 24, 2017	Pending	14034.03
Black Law Group, PLLC	Case No. D-101-CV-2016-00479	D. Maria Schmidt, for the Estate of Donald August Guarienti vs. Bradbury Stamm Construction Inc., et al.	State of New Mexico, County of Santa Fe, First Judicial District	Yes August 31, 2017	Pending	16108.02
Simmons Hanly Conroy, LLC	Case No. 16-L-0745 Case No. 17-L-0121	Chester Depowski, Jr., Deceased vs. Ameron International Corporation, et al. Albert Marinelli and Gail Marinelli vs. Ameron International Corporation, et al.	State of Illinois, Circuit Court of the Third Judicial Circuit, Madison County	Yes September 11, 2017	Pending	12320.25

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Client or Attorney & Location	Case Number	Names of Parties	Where Case was Filed	Deposition	Trial	GHP Project Number
The Law Offices of Peter G. Angelos, P.C.	Case No. 24X17000015	David Cartwright, Clayton V. Russell, Jr., Deceased, et al., vs. AC ANDS, Inc., et al.	Circuit Court for Baltimore City, Maryland	Yes September 13, 2017	Pending	14248.08
Law Office of Simon, Greenstone, Panatier, Bartlett, PC	Cause No. 2016-15523-ASB	Marion Dean Jordan, Jr., vs. Armstrong International, Inc., et al.	District Court of Harris County, Texas, 11th Judicial District	Yes September 27, 2017	Pending	14293.46
SWMW Law, LLC	Case No.: 1522-CC09967	Michael Bateman, as Surviving Heir of James Bateman, Deceased vs. 84 Lumber Company, et al.	Circuit Court of the City of St. Louis, State of Missouri, Twenty-Second Judicial Court	Yes October 3, 2017	Pending	14078.09
Jacobs & Crumplar, P.A.	C.A. No. N16C-03-079	Philip Lavelle, et al. v. The Ford Motor Company, et al.	In the Superior Court of the State of Delaware	Yes October 23, 2017	Pending	16348.02
Martzell, Bickford & Centola, A.P.C.	Case No. 2106-9604 c/w 2107-2187	Wayne Bourgeois vs. Huntington Ingalls Inc., et al.	Civil District Court for the Parish of Orleans, State of Louisiana	Yes November 1-2, 2017	Pending	08139.54
Law Office of Simon, Greenstone, Panatier, Bartlett, PC	Cause No. 2015-60651	Virginia Sue Ward, et al. vs. Ashcraft Company, Inc., et al.	In the District Court of Harris County, Texas, Asbestos MDL Court	Yes November 10, 2017	Pending	14293.37
Martzell, Bickford & Centola, A.P.C.	Case No. 2017-03460	Cheryl Bergeron vs. Huntington Ingalls, Inc., et al.	Civil District Court for the Parish of Orleans, State of Louisiana	Yes November 20, 2017	Pending	08139.60

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Client or Attorney & Location	Case Number	Names of Parties	Where Case was Filed	Deposition	Trial	GHP Project Number
Valles Law Firm PLLC	Case No. 1722-CC00708	Alan Moore, et al. vs. ABB, Inc., et al.	In the Circuit Court, State of Missouri, Twenty-Second Judicial Court (City of St. Louis)	Yes November 21, 2017	Pending	16018.06
Dean, Omar and Branham, LLP	Case No. 1:15-cv-00936	James Michael Hess vs. CBS Corporation, et al.	In the United States District Court for the Middle District of North Carolina	Yes November 27, 2017 May 1, 2019	Pending	15182.09
Gori Julian & Associates, P.C.	Case No. 16-L-1456	Carl Rhymer and Donna Rhymer, et al. vs. A.O. Smith Corporation, et al.	In the Circuit Court, Third Judicial Circuit, Madison County, Illinois	Yes November 28, 2017	Pending	14034.06
Simmons Hanly Conroy, LLC	Case No. 17-L-851	Charles Holland vs. Illinois Central Railroad Company, et al.	State of Illinois, In the Circuit Court of the Third Judicial Circuit, Madison County	Yes December 15, 2017	Pending	12320.26
Martzell, Bickford & Centola, A.P.C.	Case No. 129-719	Elvie Corsey, et al. vs. Morton International, LLC, et al.	16th Judicial District Court, Parish of Iberia, State of Louisiana	Yes January 11, 2018	Pending	08139.59
Baron & Budd, P.C.	Cause No. 16AO-CC00095	Elizabeth Ann Comer vs. CBS Corporation, etc., et al.	In the Circuit Court of Jasper County, Missouri	Yes April 20 & May 10, 2017, January 12, 2018	Pending	13315.03
Cascino Vaughan Law Offices	Case No. 12-CV-13189	John Brezonick vs. A.W. Chesterton, et al.	State of Wisconsin, Circuit Court Branch 11, Milwaukee County	Yes May 5, 2017, January 17-18, 2018 (Hearing)	Pending	13087.00

Client or Attorney & Location	Case Number	Names of Parties	Where Case was Filed	Deposition	Trial	GHP Project Number
Martzell, Bickford & Centola, A.P.C.	Case No. 06-14390	Madeline Royal, et al. vs. Northrup Grumman Systems Corp., et al.	Civil District Court, Parish of Orleans, State of Louisiana	Yes January 31, 2018	Pending	08139.62
Valles Law Firm PLLC	Case No. 17-L-003354	Christopher Nelson, et al., vs. A. O. Smith Corporation, et al.	In the Circuit Court of Cook County, Illinois, County Department, Law Division	Yes February 8, 2018	Pending	16018.05
Law Office of Simon, Greenstone, Panatier, Bartlett, PC	Civil Action No. 4:17-cv-00561	Clark Collins, et al., vs. Kraft Foods Group, Inc., et al.	United States District Court, Southern District of Texas, Houston Division	Yes February 9, 2018	Pending	07079.66
Simmons Hanly Conroy, LLC	Case No. 26 L 843	Gary Iben, et al., vs. A.W. Chesterton Company, et al.	In the Circuit Court of the Third Judicial Circuit, Madison County, Illinois	Yes March 16, 2018	Pending	12320.28
Dean, Omar and Branham, LLP	File No. 1:16-CV-01077	Franklin Delenor Finch, et al., vs. BASF Catalysts, LLC, et al.	In the United States District Court for the Middle District of North Carolina	Yes March 30, 2018	Pending	15182.14
The Lanier Law Firm	Case No. 2016-2376	Jacob Burg Adams vs. A.W. Chesterton Co., et al.	Civil District Court for the Parish of Orleans, State of Louisiana, Section: 5, Division “B”	Yes April 20, 2018	Pending	14033.05
Simmons Hanly Conroy, LLC	Case No. 16-L-1724	Kathy Jennings, et al., vs. A.W. Chesterton Company, et al.	In the Circuit Court, Third Judicial Circuit, Madison County, Illinois	Yes April 30, 2018	Pending	12320.29
Weitz & Luxenberg P.C.	Case No. BC681335	Dominic Vilardo v. ABB Inc., et al.	Superior Court of the State of California for the County of Los Angeles	Yes May 24, 2018	Pending	13220.17

Testimony/Deposition Experience Since 2009 (Updated June 11, 2020) – Kenneth S. Garza

Client or Attorney & Location	Case Number	Names of Parties	Where Case was Filed	Deposition	Trial	GHP Project Number
Dean, Omar and Branham, LLP	Case No. 2017-CP-42-04429	Jerry Howard Crawford, et al., vs. Celeanese Corporation, et al.	State of South Carolina, Court of Common Pleas, County of Spartanburg, Seventh Judicial Circuit	Yes May 30, 2018	Pending	15182.21
Bailey Peavy Bailey Cowan Heckaman PLLC	Case No. PC-2017-1721	David Kaplan, et al. vs. A.O. Smith Corp., et al.	State of Rhode Island Superior Court	Yes June 8, 2018	Pending	15338.10
Law Office of Simon, Greenstone, Panatier PC	Cause No. 2015-25111	Jerry Lee Brimberry, at al. vs. Anco Insulations, Inc., et al.	In The District Court of Harris County, 11th Judicial Court	Yes June 11, 2018	Pending	14293.48
Law Office of Simon, Greenstone, Panatier PC & Martzell, Bickford & Centola, A.P.C.	Case No. 95-783	Martha May Lee, et al., vs. American Supply Co. of Morgan City, Inc., et al.	15th Judicial District Court, Parish of Vermilion, State of Louisiana	Yes June 13, 2018	Pending	08139.57
Simmons Hanly Conroy, LLC	Cause No. 1622-CC10750	Allen Cain, et al., vs. A.W. Chesterton Company, et al.	In the Circuit Court, State of Missouri, Twenty-Second Judicial Court (City of St. Louis)	Yes June 20, 2018	Pending	12320.33
Simmons Hanly Conroy, LLC	Cause No. 1722-CC00403	Jimmy D. Hasty, Sr., et al., vs. A.W. Chesterton Company, et al.	In the Circuit Court, State of Missouri, Twenty-Second Judicial Court (City of St. Louis)	Yes June 20, 2018	Pending	12320.34
Simmons Hanly Conroy, LLC	Cause No. 1722-CC10983	James Fiebiger, et al., vs. A.W. Chesterton Company, et al.	In the Circuit Court for the City of St. Louis, Twenty-Second Judicial	Yes June 21, 2018	Pending	12320.27

Client or Attorney & Location	Case Number	Names of Parties	Where Case was Filed	Deposition	Trial	GHP Project Number
			Court, State of Missouri			
Simmons Hanly Conroy, LLC	Case No. 16-L-0393	Susan H. Schaberg, et al., vs. A.W. Chesteron Company, et al.	In the Circuit Court, Third Judicial Circuit, Madison County, Illinois	Yes June 21, 2018	Pending	12320.35
SWMW Law, LLC	Cause No. 1722-CC03797	Billy McIntosh, et al., vs. Advance Auto Parts, et al.	In the Circuit Court, State of Missouri, Twenty-Second Judicial District (City of St. Louis)	Yes June 22, 2018	Pending	14078.11
SWMW Law, LLC	Cause No. 1722-CC101915	Laura Hummel, Chad Huff, et al., vs. 4520 Corp., Inc., et al.	In the Circuit Court, State of Missouri, Twenty-Second Judicial District (City of St. Louis)	Yes June 22, 2018	Pending	14078.12
Law Office of Simon, Greenstone, Panatier PC	Cause No. 2015-57614-ASB	Walter Pesina, et al., vs. Airwell-Fedders North America, Inc., et al.	In the District Court of Harris County, Texas, 11th Judicial District	Yes July 5, 2018	Yes September 25, 2018	14293.50
Martzell, Bickford & Centola, A.P.C.	Case No. 2017-11412	Moses Powell vs. Cooper/T. Smith Stevedoring Company, Inc., et al.	Civil District Court for the Parish of Orleans, State of Louisiana	Yes July 23, 2018	Pending	08139.63
Law Office of Simon, Greenstone, Panatier PC	Cause No. 2013-34778	Johnny Ray Crober, et al., vs. AK Steel Corp., et al.	In the District Court of Harris County, Texas, 11th Judicial District	Yes July 27, 2018	Pending	14293.32
The Law Offices of Peter G. Angelos, P.C.	Civil No.: 1:16-cv-03912-CCB	John C. Dugger, et al., vs. A&L Systems Corporation, et al.	In the United States District Court for the District of Maryland	Yes July 30, 2018	Pending	14248.09

Testimony/Deposition Experience Since 2009 (Updated June 11, 2020) – Kenneth S. Garza

Client or Attorney & Location	Case Number	Names of Parties	Where Case was Filed	Deposition	Trial	GHP Project Number
Law Office of Simon, Greenstone, Panatier PC	Law No. LACE128117	Michael Gary Pringle, et al., vs. Afton Pumps, Inc., et al.	In the Iowa District Court for Scott County	Yes July 31, 2018	Pending	14293.74
Dean, Omar and Branham, LLP	Cause No.: 16SL-CC04705	Ruth Ann Borrowman, et al., vs. Certainteed Corporation, et al.	In the Circuit Court of the County of St. Louis, Twenty-first Judicial Circuit, State of Missouri	Yes August 24, 2018	Pending	15182.12
Simmons Hanly Conroy, LLC	Case No.: 17-L-220	Dalton J. Cantrelle Sr., et al., vs. A.W. Chesterton Company, et al.	In the Circuit Court of the Third Judicial Circuit, Madison County, Illinois	Yes August 27, 2018	Pending	12320.31
Dean, Omar and Branham, LLP	Case No, CJ-2016-208	Kelly Donaghey, et al., vs. Continental Motors, Inc., et al.	In the District Court of Pontotoc County, State of Oklahoma	Yes August 31, 2018	Pending	15182.20
SWMW Law, LLC	Case No. 1622-CC10186	Mary Lea Kennedy, Robert Hare, et al., vs. Advance Auto Parts, Inc., et al.	In the Circuit Court of the Twenty-Second Judicial Circuit (St. Louis City)	Yes September 10, 2018	Yes, April 5, 2019	14078.13
The Lanier Law Firm	Cause No. 2013-43263 ASB	Steve Brents, et al., vs. AO Smith Corporation, et al.	In the District Court of Harris County, Texas, 11th Judicial District	Yes September 13, 2018	Pending	14033.06
Simmons Hanly Conroy, LLC	Cause No. 1722-CC11161	Michael Reed, et al., vs. A.O. Smith Corporation, et al.	In the Circuit Court, State of Missouri, Twenty-Second Judicial Circuit	Yes September 17, 2018	Pending	12320.36
Law Office of Simon, Greenstone, Panatier PC	Case No. 60CV-14-424	Cleon Nolan Edwards, et al., vs. ABB, Inc., et al.	In the Circuit Court of Pulaski County, Arkansas, Thirteenth Division	Yes October 8, 2018	Pending	14293.72

Testimony/Deposition Experience Since 2009 (Updated June 11, 2020) – Kenneth S. Garza

Client or Attorney & Location	Case Number	Names of Parties	Where Case was Filed	Deposition	Trial	GHP Project Number
Law Office of Simon, Greenstone, Panatier PC	Cause No. 2015-18629-ASB	Axel Cockrill vs. Bechtel Alcoa, Inc., et al.	In the District Court 11th Judicial District Harris County, Texas	Yes October 15, 2018	Pending	14293.40
Baron & Budd, P.C.	Cause No. 2018-04835-ASB	Hubert Lee Shepard, et al., vs. Ameron International Corp., et al.	In the District Court of Harris County, Texas, 11th Judicial District	Yes October 17, 2018	Pending	13315.04
Law Office of Simon, Greenstone, Panatier PC	Cause No. 2016-13659-ASB	Bonnie Lou Mayfield, John Rash, et al., vs. American Biltrite Inc., et al.	In the District Court of Harris County, Texas, 11th Judicial District	Yes October 19, 2018	Pending	14293.47
Weitz & Luxenberg P.C.	Case No. BC699945	Houshang Sabetian, et al., vs. Air & Liquid Systems Corporation, et al.	Superior Court State of California, County of Los Angeles, Unlimited Jurisdiction, Spring Street Courthouse	Yes October 23, 2018 November 16, 2018 December 18, 2018	Yes February 22, 2019	13220.18
Maune Raichle Hartley French & Mudd, LLC	Case No. 2017-8981	Anthony J. Licciardi, III vs. Taylor-Seidenbach, Inc., et al.	Civil District Court for the Parish of New Orleans, State of Louisiana	Yes October 30, 2018	Pending	18176.01
Martzell, Bickford & Centola, A.P.C.	Case No. 2014-4958	John Bolden vs. Huntington Ingalls Incorporated, et al.	Civil District Court for the Parish of Orleans, State of Louisiana, Section: 11	Yes November 6, 2018	Pending	08139.64

Baron & Budd, P.C.	Cause No. 2018-35837-ASB	Dale Hale, et al., vs. Western Pulp Products Co., et al.	In the District Court of Harris County, Texas, 11th Judicial District	Yes November 19, 2018	Pending	13315.06
Ron Austin Law, LLC	Case Number 2015-08422	Earl J. Gisclair, Sr. vs. Huntington Ingalls Incorporated, et al.	Civil District Court, Parish of Orleans, State of Louisiana	Yes November 28, 2018	Pending	18208.01
Cascino Vaughan Law Offices	Case No. 16-CV-1390	Steven Ebel, special administrator vs. Sprinkmann Sons & Grunau Company	In the Circuit Court of Milwaukee County, State of Wisconsin	Yes November 29, 2018	Pending	13087.06
Weitz & Luxenberg P.C.	Case No. RG17886625	Alex Williams vs. Dana Companies, et al.	Superior Court of the State of California for the County of Alameda	Yes December 6, 2018	Pending	13220.20
Weitz & Luxenberg P.C.	Case No. BC696433	Ervan Groves, et al. vs. ABB, Inc., et al.	Superior Court of the State of California for the County of Los Angeles	Yes December 13, 2018	Yes April 3, 2019	13220.21
Law Office of Simon, Greenstone, Panatier PC	No. CJ-2015-5853	Thurman Lee Hester vs. Alfa Laval, et al.	In the District Court of Oklahoma County, State of Oklahoma	Yes January 15, 2019	Pending	14293.82
Simmons Hanly Conroy, LLC	Case No. 2018L 000705	Ronald Parks, et al. vs. A.O. Smith Corporation, et al.	In the Circuit Court, Third Judicial Circuit, Madison County, Illinois	Yes January 18. 2019	Pending	12320.39
The Lanier Law Firm	Case No. 1822-CC00 321	Martin F. Boyer, et al. vs. 3M Co. (f/k/a Minnesota, Mining & Manufacturing Co.), et al.	In the Circuit Court, State of Missouri, Twenty-Second Judicial Circuit (City of St. Louis)	Yes January 25, 2019	Pending	14033.08
Law Office of Simon, Greenstone, Panatier PC	Case No. CJ-2017-107	Peggy Madren, et al. vs. Montello, Inc., et al.	In the District Court of Caddo	Yes February 14, 2019	Pending	14293.57

			County, State of Oklahoma			
Law Office of Simon, Greenstone, Panatier PC	File No. 1:16-CV-00953	Linda Fulton Southern, et al. vs. Alcatel-Lucent USA Inc., et al.	In the United States District Court for the Middle District of North Carolina, Greensboro Division	Yes February 15, 2019	Pending	14293.80
Simmons Hanly Conroy, LLC	Case No. 17-L-1686	Albert Manring, et al. vs. 3M Company, et al.	In the Circuit Court, Third Judicial Circuit, Madison County, Illinois	Yes March 4, 2019	Pending	12320.37
Martzell, Bickford & Centola, A.P.C.	Case No. 2018-9726	Theresa Robinson vs. Huntington Ingalls Incorporated, et al.	Civil District Court for the Parish of Orleans, State of Louisiana	Yes March 18, 2019	Pending	08139.65
Dean, Omar and Branham, LLP	Case No. CJ-2016-57	Brennan James Atkeson, et al. vs. Union Carbide Corporation, et al.	In the District Court of Pontotoc County, State of Oklahoma	Yes March 29, 2019	Pending	15182.23
Martzell, Bickford & Centola, A.P.C.	Case No. 2017-11205	Irma Hannegan vs. PPG Industries, Inc., et al.	Civil District Court for the Parish of Orleans, State of Louisiana	Yes April 2, 2019	Pending	08139.66
Martzell, Bickford & Centola, A.P.C.	Case No. 2017-10551	Thomas Borne vs. Huntington Ingalls, Inc., et al.	Civil District Court for the Parish of Orleans, State of Louisiana	Yes April 23, 2019	Pending	08139.67
Nemeroff Law Firm	Cause No. 2007-30131-ASB	Kevin W. Willhelm, Larry Joe Floyd, et al. vs. American Honda Motor Co., Inc., et al.	In the District Court, 11th Judicial District, Harris County, Texas	Yes May 6, 2019	Pending	18006.02
Weitz & Luxenberg P.C.	LASC CASE NO. BC 715172	Apostolos Agrios, et al. vs. 3M Company, et al.	Superior Court of the State of	Yes June 10, 2019	Pending	13220.24

			California, County of Los Angeles			
Dubose Law Firm	Case No. CJ-2018-00026	Richard McClendon, et al. vs. Chevron Phillips Chemical Company, LP, et al.	In the District Court of Creek County, State of Oklahoma	Yes June 11, 2019	Pending	12345.24
Karst & Von Oiste, LLP	No. 17-2-13898-3-SEA	Janet Hutchins, Charles Requa, et al. vs. Atlantic Richfield Company, et al.	In the Superior Court of the State of Washington for King County	Yes June 14, 2019	Pending	13189.29
Black Law Group, PLLC	No. D-101-CV-2018-01675	Tom Jimmy Montoya, et al. vs. American Equipment Manufacturing, et al.	First Judicial District Court, County of Santa Fe, State of New Mexico	Yes June 20, 2019	Pending	16108.04
Simmons Hanly Conroy, LLC	No. 18-L-1220	Carol Scott, et al. (James Scott deceased) vs. A.O. Smith Corporation, et al	In the Circuit Court, Third Judicial Circuit, Madison County, Illinois	Yes August 5, 2019	Pending	12320.47
The Law Offices of Peter G. Angelos, P.C.	Case No. 24X18000231	Walter L. Akehurst, et al., vs. ACandS, INC., et al.	In the Circuit Court for Baltimore City	Yes August 8, 2019	Pending	14248.11
Simmons Hanly Conroy, LLC	No. 2019-2167	Dennis M. Jeter vs. Ameron International Corporation, et al.	Civil District Court for the Parish of Orleans, State of Louisiana	Yes August 9, 2019	Pending	12320.42
SWMW Law, LLC	Case No. 1822-CC03511	Robert Suter, et al. vs. 4520 Corp., Inc., Successor-In-Interest to Benjamin F. Shaw Company, et al.	In the Circuit Court, State of Missouri, Twenty-Second Judicial Circuit (City of St. Louis)	Yes August 12, 2019	Pending	14078.15

Law Office of Simon, Greenstone, Panatier PC	Cause No. 2013-66124-ASB	Lakeisha Rucker Wilson, Gregory Brian Wilson, et al. vs. Dow Chemical Company, et al.	In the District Court, Harris County, Texas 11th Judicial District	Yes August 22, 2019	Pending	07079.76
Law Office of Simon, Greenstone, Panatier PC	Cause No. CC19-00662-C	Paul Konapelsky, et al. vs. Kaiser Gypsum Company, Inc., et al.	In the District Court of Harris County, Texas, 11th Judicial District	Yes August 27, 2019	Pending	14293.86
Weitz & Luxenberg P.C.	Case No. BC89137	Richard Tyler, et al. (Robert Tyler deceased) vs. Algoma Hardwoods, Inc., et al.	Superior Court of the State of California for the County of Los Angeles	Yes August 29, 2019	Pending	13320.19
Baron & Budd, P.C.	Cause No. 2015-43126-ASB	Dovie Klein, et al. (Charles Klein deceased) vs. CBS Corporation, f/k/a Viacom, Inc. (successor-by-merger to Westinghouse Electric Corporation), et al.	In the District Court of Harris County, Texas, 11th Judicial District	Yes September 6, 2019	Pending	13315.09
Weitz & Luxenberg P.C.	Case No. BC712874	Ruby Kaylor vs. Aurora Pump Company, et al.,	Superior Court of the State of California for the County of Los Angeles	Yes September 13, 2019	Pending	13220.25
SWMW Law, LLC	Cause No. 1722-CC11037	Carole Bergeman, et al. (Robert Bergeman deceased) vs. Bird Corporation, et al.	In the Circuit Court State of Missouri, Twenty-Second Judicial Circuit (City of St. Louis)	Yes September 30, 2019	Pending	14078.16
Weitz & Luxenberg P.C.	Case No. RG17868697	Robert Skelton, et al. (Wanda Skelton deceased) vs. Allied	Superior Court of the State of California for the County of Alameda	Yes October 1, 2019	Pending	13220.26

		Fluid Products Corp., et al.				
Gori Julian & Associates, P.C.	Case No. 20180290	Dennis Peltier, et al. vs. 3M Company, et al.	Civil District Court, Parish of Lafayette, State of Louisiana	Yes October 3, 2019	Pending	14034.08
Law Office of Simon, Greenstone, Panatier PC	Cause No. 2019-15985-ASB	Mary Prezioso, et al. (Thomas Prezioso deceased) vs. Cyprus Amax Minerals Company, et al.	In the District Court of Harris County, Texas 11th Judicial District	Yes October 7, 2019	Pending	14293.21
Simmons Hanly Conroy, LLC	Civil Action No. 18-361 / Case No. C665093	James T. McAllister, Jr. vs. McDermott, Inc., et al.	United States District Court, Middle District of Louisiana, 19th Judicial District Court, Parish of East Baton Rouge, State of Louisiana	Yes October 8, 2019	Pending	12320.32
Simmons Hanly Conroy, LLC	Case No. 19STCV00653	Gerald Wilson, et al. vs. ABB, Inc., et al.	Superior Court of the State of California for the County of Los Angeles	Yes October 21, 2019	Pending	12320.48
Simmons Hanly Conroy, LLC	Case No. 19 L 117	Joseph Carneghi vs. A.O. Smith Corporation, et al.	In the Circuit Court, Third Judicial Circuit, Madison County, Illinois	Yes October 28, 2019	Pending	12320.44
Simmons Hanly Conroy, LLC	Case No. 19 L 401	Donald Field, et al. vs. A.O. Smith Corporation, et al.	In the Circuit Court, Third Judicial Circuit, Madison County, Illinois	Yes October 28, 2019	Pending	12320.50
Simmons Hanly Conroy, LLC	Cause No. 1822-CC10568	Deanna Gatson, et al. (Grant Hilburn deceased) vs. A.W.	In the Circuit Court, State of Missouri, Twenty-Second	Yes October 31, 2019	Pending	12320.41

		Chesterton Company, et al.	Judicial Circuit (City of St. Louis)			
Law Office of Simon, Greenstone, Panatier PC	File No. 1:15-CV-00448-WO-JLW	Nancy Effinger, et al. (James Effinger deceased) vs. Air & Liquid Systems Corporation, et al.	United States District Court, Middle District of North Carolina, Greensboro Division	Yes November 4, 2019	Pending	14293.91
Law Office of Simon, Greenstone, Panatier PC	Civil Action No. 1:18-CV-00410-LCB-LPA	Larry Woolard, et al. vs. Carrier Corporation, et al.	In the United States District Court for the Middle District of North Carolina, Greensboro Division	Yes November 4, 2019	Pending	14293.90
The Law Offices of Peter G. Angelos, P.C.	Consolidated Case No. 24X19000010	John Huber, et al. vs. Union Carbide Corporation, et al.	In the Circuit Court for Baltimore City	Yes November 22, 2019	Pending	14248.13
The Law Offices of Peter G. Angelos, P.C.	Consolidated Case No. 24X19000010	John Huber, et al. vs. Union Carbide Corporation, et al.	In the Circuit Court for Baltimore City	Yes November 22, 2019	Pending	14248.14
The Law Offices of Peter G. Angelos, P.C.	Consolidated Case No. 24X19000010	John Huber, et al. vs. Union Carbide Corporation, et al.	In the Circuit Court for Baltimore City	Yes November 22, 2019	Pending	14248.15
Law Office of Simon, Greenstone, Panatier PC	Cause No. 2019-28496-ASB	Elizabeth Stoner, et al. (Gregory Stoner deceased) vs. Kaiser Gypsum Company, Inc.	In the District Court of Harris County, Texas, 11th Judicial District	Yes December 12, 2019	Pending	14293.83
The Law Offices of Peter G. Angelos, P.C.	Civil Action No. DKC 18-2590	Amanda Brooke Hailey, et al. (Charles Shockley deceased) vs. Air and Liquid Systems Corporation, et al.	In the United States District Court for the District of Maryland	Yes January 15, 2020	Pending	14248.12

Law Office of Simon, Greenstone, Panatier PC	Case No. 16 L 5625	Joyce DuQuette, et al. (Thomas DuQuette deceased) vs. ALFA Laval, Inc., et al.	In the Circuit Court of Cook County, Illinois	Yes January 17, 2020	Pending	14293.99
Cheek Law Firm	Case No. 2018-8518	Booker W. Holmes vs. Albert Bossier, Jr., et al.	Civil District Court, Parish of Orleans, State of Louisiana	Yes January 24, 2020	Pending	19407.02
Simmons Hanly Conroy, LLC	Case No. 19-L-0975	Patrick L. Barron Sr. vs. A.W. Chesterton Company, et al.	In the Circuit Court. Third Judicial Circuit, Madison County, Illinois	Yes January 28, 2020	Pending	12320.54
Simmons Hanly Conroy, LLC	Case No. 19-012541	Johnny Pinkston, et al. vs. Air & Liquid Systems Corporation, Buffalo Pumps Division, et al.	In the Circuit Court of the 17th Judicial Circuit in and for Broward County, Florida	Yes February 4, 2020	Pending	12320.52
Dean, Omar and Branham, LLP	C/A No. 1:18-CV-00091	Sharon Whitehead, et al. (James Whitehead deceased) vs. Air & Liquid Systems Corp., et al.	In the United States District Court for the Middle District of North Carolina	Yes February 7, 2020	Pending	15182.26
Nemeroff Law Firm	Case No. 2019-04640	Judith Lunn vs. McCarty Corporation, et al.	Civil District Court for the Parish of Orleans, State of Louisiana	Yes February 20, 2020	Pending	18006.03
Black Law Group, PLLC	Case No. D-101-CV-2018-00408	Lee Hunt, et al. (Valerio Lucero deceased) vs. Public Service Company of New Mexico, et al.	First Judicial District Court, County of Santa Fe, State of New Mexico	Yes February 24, 2020	Pending	16108.05
Weitz & Luxenberg P.C.	Case No. 19STCV36610	Barbara Franklin vs. Blue Bird Corporation, et al.	Superior Court – State of California, County of Los Angeles	Yes February 26, 2020	Pending	13220.32

Simmons Hanly Conroy, LLC	Case No. 19-10545	Henry Pete vs. Boland Marine and Manufacturing Company, LLC, et al.	Civil District Court for the Parish of Orleans, State of Louisiana	Yes February 28, 2020	Pending	12320.53
Waters & Kraus, LLP	Cause No. 2018-51048-ASB	Donna L. Hunt (Jerry Hunt deceased), et al. vs. Certainteed Corporation, et al.	In the District Court, 11th Judicial District, Harris County, Texas	Yes March 4, 2020	Pending	12294.09
Napoli Shkolnik PLLC	Case No. C681782	Larry Thibodeaux vs. BP America, F/K/A Standard Oil Indiana, A/K/A Amoco, et al.	19th Judicial District Court for the Parish of East Baton Rouge, State of Louisiana	Yes April 29, 2020	Pending	16094.03
Martzell, Bickford & Centola, A.P.C.	Case No. 20219-12389	Karen Soulet vs. Lou-Con, Inc., et al.	Civil District Court for the Parish of Orleans	Yes June 5, 2020 Cont. June 10, 2020	Pending	08139.69
Baron & Budd, P.C.	Case No. 79251	Edward J. Ruffin, Jr. vs. Entergy Louisiana, LLC, et al.	18th Judicial District Court for the Parish of Iberville	Yes June 11, 2020	Pending	13315.16

APPENDIX E

GHP LITIGATION HOURLY RATE SCHEDULE

December 10, 2019

Technical Support	$65.00 per hour
Support Services	$75.00 per hour
Project Coordinator 1	$100.00 per hour
IH Tech	$90.00 per hour
CADD with Operator or Arch Tech	$100.00 per hour
Industrial Hygienist or Construction Administrator	$100.00 per hour
Architectural or Engineering Graduate	$115.00 per hour
Sr Industrial Hygienist	$115.00 per hour
Registered Architect / Engineer	$125.00 per hour
Associate Project Manager	$125.00 per hour
Project Coordinator 3	$150.00 per hour
Project Manager	$165.00 per hour
Sr Project Manager	$200.00 per hour
Senior Manager / Certified Industrial Hygienist (CIH)	$250.00 per hour
Principal Architect / Engineer / CIH	$400.00 per hour

Reimbursement for project-related expenses at cost times 1.20 multiplier.

Payment due within thirty (30) days of receipt of invoice.
Interest on accounts over thirty (30) days past due is 1.5% per month.
Rates are effective Jan 1, 2019 (revised July 2019)

APPENDIX F

General Asbestos Exposure Report

Table of Contents

General Asbestos Exposure Report

1. Introduction

"Asbestos has been used in cement products, plaster, fireproof textiles, vinyl floor tiles, thermal and acoustical insulation, and sprayed materials." (USEPA, 1979) "Asbestos fibers do not have any detectable odor or taste. They do not dissolve in water or evaporate and are resistant to heat, fire, chemical and biological degradation. … As a result of its low cost and desirable properties such as heat and fire resistance, wear and friction characteristics, tensile strength, heat, electrical and sound insulation, adsorption capacity, and resistance to chemical and biological attack, asbestos has been used in a very large number of applications and types of products." (ATSDR, 2001) According to Hueper, 1942, "The production of asbestos has risen enormously in recent years. It received this great impetus from its use in the automobile industry. … Occupational contact with asbestos is present in many industries using asbestos products. Asbestos is employed for a great variety of purposes, such as the manufacture of incombustible and insulating materials (fire resistant clothes, blankets, theater curtains, sheets, ropes, cords, twine, and threads), filter cloths, mill-board, wall board, shingles, tiles, mortar (together with cement and plaster of Paris for providing a fire-proof wall lining), clinkers, gaskets, packing material of pumps, insulating material of steam pipes, water pipes, boilers, and electric wires, brake lining, paper, mattresses, adsorbent dyes (for manufacture of fire proof and acid proof stains), ingredient of rubber products, and artificial wood." (Hueper, 1942)

2. Industrial Hygiene

Historic asbestos exposures were mostly measured using an impinger, which gave results in million particles per cubic foot of air (mppcf) or using phase contrast microscopy (PCM) to examine sampling filters, which is an optical microscopy technique that gave results in fibers per cubic centimeter of air (f/cm^3). It should be noted that units "f/cc" or "f/cm^3" (fibers per cubic centimeters) and "f/ml" (fibers per milliliter), have the same quantitative meaning. The PCM method measures only fibers equal to or longer than 5 micrometers, with an aspect ratio (length to width) of equal to or greater than 3 to 1. Short fibers are not counted, and thin fibers are not even seen by the analyst because the optical scope cannot resolve fiber widths less than 0.25 micrometers. The mppcf measurement gives no information about

fiber size, large or small, since it only provides a total numerical count of dust particles present. With these historic data, and with contemporary PCM data, the total number of fibers present and the fiber size distribution are not known. Transmission electron microscopy (TEM) is another and more current method of analysis. This approach is appealing because it quantitatively measures only airborne asbestos fibers and reports them in structures per cubic centimeter (s/cc). This method can also distinguish between the different types of asbestos. Using historic data on average exposures or ranges of exposures in a given operation or job to estimate exposures for an individual or a cohort must be done with these limitations and/or capabilities in mind.

Asbestos exposures in any individual event are influenced by many variables which may be described qualitatively or quantitatively. These include, but are not limited to, the work being done, the particular method or work practice by which the work is done, ventilation (mechanical or natural), air flow patterns and characteristics, atmospheric conditions, types of asbestos-containing products, amount of asbestos in the product used or disturbed, proximity to the work, duration of the work, duration of fiber settling times and time spent in an area after work, and proximity of other co-workers conducting the same or different asbestos-related activities. Given these variables, it is logical that an individual's exposure profile may have a broad range for any given time period or task, and certainly for a career. Indeed, the fact that the average exposure for a particular trade, job or task may be low does not mean that the exposure was low for every worker in that trade, job or task. Historic and contemporary data confirm this variability.

Instantaneous, real time measurements specific to asbestos exposure were not, and are not, done. An asbestos air sample is an average of varying concentration over some period of time. This is true for short-term sampling as well as long-term sampling. Within a sampling period, there can be peak asbestos exposures which may not be observable in the overall average. For example, if an air sample is taken for 4 hours (240 minutes) and the reported result is 1.0 f/cm^3 that number could represent 30 minutes at 5.0 f/cm^3 (500% of the reported result) and 210 minutes at 0.4 f/cm^3 (40% of the reported result).

For industrial hygiene purposes, the ranges of exposure from multiples sampling data points, which can be represented through short-term or long-term sampling events, can be more useful in understanding the potential magnitude of exposure than just the average of multiple samples. The full range of

exposures for a given workplace or task may not be known if both the highest and lowest concentrations were not measured or considered. Even if the extremes were measured or considered, the data may be subject to the limitations of the sampling methodology. Using the example above, the range would be 0.4 f/cm^3 to 5.0 f/cm^3 with an average of 2.7 f/cm^3 (n=2).

Industrial hygiene studies will report data as exposure levels during the course of the sampling event (short-term) or as a time–weighted average (TWA). "For NIOSH RELs, '**TWA**' indicates a time-weighted average concentration for up to a 10-hour workday during a 40-hour workweek. … TWA concentrations for OSHA **PEL**s must not be exceeded during any 8-hour workshift of a 40-hour workweek." (NIOSH, 2007) "To meet the requirements of establishing the TWA concentrations, the sampling method and time periods should be chosen to average out fluctuations that commonly occur in a day's work. If there are wide fluctuations in concentration, the long-term samples should be supplemented by samples designed to catch the peaks separately." (Plog, 1996) For example, if a 30-minute sampling event per a task occurs and a concentration of 1.0 f/cm^3 is reported and this event only occurs once in a work day, then the 8-hour TWA is 0.0625 f/cm^3 (below the current PEL). If this event occurred twice in a workday, then the 8-hour TWA is 0.125 f/cm^3 (above the current PEL). If this event was consistent throughout an entire workday, then the 8-hour TWA is 1.0 f/cm^3.

Asbestos exposure assessment is affected by the measurement techniques employed and the judgement(s) of an industrial hygienist professional. The variables in the workplace, to the degree that they are reported, and limitations in the sampling methodology and work practice methodology must be considered to prevent bias in interpretation of data and studies. For the purposes of exposure assessment, industrial hygiene literature data or information may be presented quantitatively, qualitatively, or both. Also, exposure data may be represented as short term data, long-term data, or both.

"Occupational Hygiene is the science and art 'dedicated to the anticipation, recognition, evaluation, and control of environmental factors arising in or from the workplace that may result in injury, illness, impairment, or affect the well-being of workers and members of the community'" (DiNardi, 2003). Regarding anticipation, it is the "expectation of potential health hazards." Regarding recognition, it is the "acknowledgment of health hazards in the workplace". Regarding anticipation and recognition, an

industrial hygienist characterizes the nature of the hazard, in this case asbestos, by understanding: the materials that contain asbestos; what the asbestos-containing material was used for; the historic understanding of work practice(s) related to these asbestos-containing materials; the exposure(s) associated with asbestos-containing material work practices; and human health implications due to work activity, and the potential risks associated with asbestos exposure. Industrial hygiene literature includes information describing these aspects historically and currently. These aspects can then be compared to what an individual or individuals may describe about their work experience. (DiNardi, 2003)

Regarding evaluation, an industrial hygienist will characterize exposure concentrations and temporal variability based on asbestos material type and work activity. When assessing an individual's exposure to asbestos, an industrial hygienist may rely on a worker's contemporaneous workplace asbestos exposure data, if this data exists; contemporaneous workplace asbestos exposure data for another worker or workers with a similar job or work activity; current or historic published industrial hygiene data describing similar work tasks or jobs; current or historic published or unpublished industrial hygiene literature (e.g., regulatory / recommendation publications, journal studies, industry IH field studies); published or unpublished laboratory studies or simulations studies. Considering the above IH information gives an industrial hygienist a magnitude range of exposure that is similar to what may be described for an individual. Industrial hygienists use many techniques to assess exposure when little or no data exist for a given situation or worker. Conclusions may be drawn from data in the literature if conditions have sufficient similarity to the case of interest. Simulations can be reliable for estimating exposure. These data sources can be used to establish a likely range of exposures and probable average. For a given worker, however, the actual exposures at the extremes may be more or less than studies and literature indicate. Industrial hygiene literature reporting asbestos exposures orders of magnitude greater than background levels may describe these exposures as significant. General conclusions about exposures of a given worker population may not be accurate for an individual worker. (DiNardi, 2003)

Regarding workplace controls, an industrial hygienist considers controls implemented, if any. Such as substitution, engineering controls, administrative controls and personal protective equipment (e.g., hierarchy of controls).

In general, an industrial hygienists' decision about workplace exposure "is based on a combination of

observations, interviews [information provided by workers], and measurement of … air contaminates arising from the process or work operation and the effectiveness of control measures use." (Plog, 1996) My asbestos exposure assessment methodology includes having an understanding of the: expectation and acknowledgement of the potential human health implications due to asbestos exposure as represented in the IH literature; nature of its use historically and currently; characterization of asbestos hazard as reported in the IH literature; industry accepted and sound methodologies employed in the IH literature; similar work practices in the IH literature involving asbestos-containing materials; comparison of similar work activity exposure in the IH literature to work activities described by an individual or individual(s); likely exposure ranges expected; in-place controls, if any.

In some cases, historical exposure data are limited in quantity and scope. It is unreasonable to assert that such historical data, simulation data, etc. can only be reliable for estimating exposures that match in every detail the historical events, the simulations, etc. It is standard industrial hygiene practice to consider, with appropriate care, all data which may have bearing on a worker's exposure. If industrial hygiene were limited to estimating exposures only where historical data existed as an exact match for the situation under assessment, there would be no meaningful and practical way to predict average exposures and/or ranges of exposures for the boundless variety of work places, work practices, and products in commerce today and historically. Without exposure estimates (both retrospective and prospective), health effects could not be related to workplace conditions, adequate exposure limits could not be established, and epidemiology studies would have insufficient foundation related to environmental conditions. This situation would preclude adequate worker protection and make workers "canaries" like those birds used in coal mines in times past.

3. Regulations and Recommendations

According to the Memorandum on the Industrial Diseases of Silicosis and Asbestosis, in 1935, the exposure to asbestos-containing dust from various material types and guidance control are discussed. The disease asbestosis was described as "a special type of fibrosis of the lung tissue. … Industries and processes in which asbestosis occurs – Processes involving exposure to asbestos dust which are known to give rise to asbestosis or in which the conditions are such as to be liable to produce disease, are the breaking, crushing, disintegrating, opening and grinding of asbestos and the mixing or sieving of asbestos

or any admixture of asbestos, the manufacture of asbestos textiles, the making of insulating slabs or sections and the making or repairing of insulating mattresses composed wholly or partly of asbestos, and the sawing, grinding, and turning in the dry state of articles composed wholly or partly of asbestos such as motor car brake, clutch linings, jointings, electric insulating materials and some types of electrodes." Regarding preventative asbestos dust exposure measures, the suppressions of dust is mentioned as the "chief means of preventing the disease [asbestosis]." "The adoption of wet methods, effective enclosure of dust-producing machines, adoption of enclosed mechanical methods instead of hand conveyance and dusty hand work generally, and application of exhaust draught at dust-producing points." (Great Britain Home Office, 1935)

According to Dreessen, "A characteristic of asbestosis is the finding of asbestosis bodies in the lungs and in the sputum. … Above 5 million particles per cubic foot, numerous cases of well-marked asbestosis were found. It would seem that if the dust concentration in asbestos factories could be kept below 5 million particles (the engineering section of the report had shown how this may be accomplished), new cases of asbestosis probably would not appear." (Dreessen, 1938)

In 1943, The American Industrial Hygiene Association (AIHA) described "eight common types of disease and methods for their prevention," one of which was asbestosis, and the sources and jobs for potential asbestos exposure in the work environment. They further recommended controls for dealing with this hazard such as segregation of dusty work, special ventilation, respirators, and periodic medical examinations. (AIHA, 1943) In relation to occupation and the environment, Hueper describes asbestos as an observed cancer-causing agent. "Asbestosis cancer of the lung is the most recent newcomer among the occupational cancers of this organ" (Hueper, 1943). Asbestos was "known or suspected to cause occupational cancer" in the work environment. (JAMA, 1944)

The American Conference of Governmental Industrial Hygienists (ACGIH) in 1946 published its recommended exposure standard for asbestos. The standard was called a maximum allowable concentration (MAC) and was set at 5 million particles per cubic foot (mppcf) as an 8-hr TWA. (ACGIH TLV, 1946-1991) The ACGIH standard, which is now called the threshold limit value (TLV), has been reduced many times since and is currently at 0.1 f/cc as an 8-hr TWA. This measurement is specific to fibers rather than all dust; however, the technique does not distinguish asbestos from non-asbestos

fibers. The ACGIH definition of the TLV is “the time-weighted average concentration for a conventional 8-hour workday and a 40-hour work week, to which it is believed that ***nearly all*** workers may be repeatedly exposed, day after day, without adverse effect.” {emphasis added} (ACGIH 2006) Of special note to the user of ACGIH’s TLVs, “The values listed in this book are intended for use in the practice of industrial hygiene as guidelines or recommendations to assist in the control of potential workplace health hazards and for no other use. These values are *not* fine lines between safe and dangerous concentrations and *should not* be used by anyone untrained in the discipline of industrial hygiene.” (ACGIH, 2009)

According to Stokinger, “There is still one group of substances for which some method should be devised for establishing safe air standards - the industrial cancerigens. … As a suggested method of approach, the following is offered: To the level judged safe for other types of systemic injury add a safety factor for carcinogenicity. The magnitude of the safety factor is suggested to be from 100 to 500.” (Stokinger, 1956).

The adequacy of the ACGIH MAC, which remained at 5 mppcf through 1973, was called into question in the literature in 1964 and 1965. (Marr, 1964) (Schall, 1965) In 1968, two published articles concluded that the MAC was too high. (Balzer, Environment, 1968) (Balzer, Industrial Hygiene, 1968)

Pre-OSHA, some US states regulated asbestos in the work environment to varying degrees. In some cases, it was simply listed as a potential occupational disease, and in others, a defined threshold limit value assigned [5.0 mppcf] with recommended control practices for achievement in the work environment. (California, 1943) (Wisconsin, 1947) (West Virginia, 1951) (Louisiana, 1952) (Texas, 1957) (New Jersey, 1958) (Pennsylvania, 1969).

In 1971, the US Occupational Safety & Health Agency (OSHA) published its first asbestos regulation. “A 12 f/cc permissible exposure limit (PEL) was included in the initial promulgation on May 29, 1971. … In response to a petition by the Industrial Union Department of the AFL-CIO, OSHA issued an Emergency Temporary Standard on asbestos on December 7, 1971, OSHA, which established a PEL to 5.0 f/cc as an 8-hour time-weighted average (TWA) and peak exposure level of 10.0 f/cc. In June 1972, OSHA promulgated a new final standard that established an 8-hour TWA PEL of 5 f/cc and a ceiling limit of 10 f/cc. These limits were intended primarily to protect employees against asbestosis, and it was hoped that they would provide some incidental degree of protection against asbestos induced forms of cancer.

Effective July 1976, OSHA's 8-hour TWA limit was reduced to 2 f/cc and this limit remained in effect up to the effective date of the revised 1986 standards. (OSHA FR, 1994) On June 20, 1986, OSHA reduced the PEL to 0.2 f/cc as an 8-hour TWA and an Action Level of 0.1 f/cc. On September 14, 1988, OSHA established an Excursion Limit of 1.0 f/cc for 30 minutes. Finally, on August 19, 1994, OHSA reduced the PEL again to its present level of 0.1 f/cc as an 8-hour TWA. (Martonik, 2001). Even this current PEL is not considered by OSHA to be fully protective and is still considered “a significant risk.” (OSHA FR, 1994)

In 1971, the US Environmental Protection Agency (USEPA) listed asbestos as a hazardous air pollutant. The EPA recognizes the concept of friability relative to the exposure risk associated with in-place asbestos-containing materials (ACMs). The agency’s regulations for demolition and renovation require methods to control the release of fibers to the environment when ACMs to be disturbed are friable in-place and when ACMs which are not friable in-place will be rendered friable by the intended disturbance. ACM will release asbestos fibers into the air when it “has deteriorated or sustained physical injury such that the internal structure (cohesion) of the material is inadequate or, if applicable, which has delaminated such that its bond to the substrate (adhesion) is inadequate or which for any other reason lacks fiber cohesion or adhesion qualities. Such damage or deterioration may be illustrated by the separation of ACM into layers; separation of ACM from the substrate; flaking, blistering, or crumbling of the ACM surface; water damage; significant or repeated water stains, scrapes, gouges, mars or other signs of physical injury on the ACM.” (USEPA, How to Manage, 1996) {ACBM= asbestos-containing building material}

A regulatory summary is presented by Georgia Tech asbestos training courses. (Georgia Tech, 1995) OSHA regulates all forms of asbestos minerals (chrysotile, amosite, etc.) in the same manner because all types are known to cause disease, and the EPA also regulates all asbestos types in the same way.

4. Airborne Asbestos Hazard

The hazard of workplace dust, including asbestos, has been recognized since the 1930s, and engineering controls, proper exhaust ventilation, and respirator protection were recommended. National Safety News, August 1933, The Mechanical Control of Occupational Diseases, David S. Beyer, states that “[w]hen the subject of dust is mentioned most of us probably think of visible particles. In fact, much of the dust removal work, even by companies specializing along this line in the past, has been directed at this form of

dust. Medical research has shown us, however, that dust that is most dangerous, through its deep inhalation into the lungs, is so small that the individual particles are invisible and can only be seen by the naked eye if they are gathered in a dense cloud, which may have the appearance of a gray fog. … In general, the most reliable way to correct a dust hazard is to install exhaust equipment that will capture the dust at the point where it is generated." (Beyer, 1933)

TRANSACTIONS, 26th National Safety Congress, 1937: What Industrial Dusts Are Harmful? Why? Dr. R.R. Sayers, states that "Dust Control. Engineering and medical control are the two most important factors in combating the industrial dust hazard, and are to a large extent complementary. … Dust may be entrapped at its source by suction devices and thus removed and collected. … Generally speaking, the exhaust ventilation method, where applicable, is to be preferred in controlling a dust hazard. … Sometimes a dusty process can be completely enclosed in a sealed room or compartment. … A great deal of attention has been given the subject of individual protection from dust, and there are many types of respiratory protective devices now available. These are generally of two types: those which provide fresh air from an uncontaminated source and those which rely upon a filtering medium for removing dust from the air breathed. Where the use of such a device is indicated, only one of the types approved by the U.S. Bureau of Mines should be used. As a rule, it may be said that masks, respirators, or other such protective device should be used only where exposure to the dust is intermittent and brief, or where some unusual conditions makes a more adequate dust control impracticable." (Sayers, 1937) Bonsib relays "[o]ne common-sense answer is that any atmosphere in which dust is visible to the naked eye is certainly too dusty to be breathed with safety by human beings, and the wise, farsighted, human employer will immediately start to decrease the dust content in any atmosphere when dust is visible. After he has eliminated visible dust, there may still be enough very small invisible dust to cause harm to the health of those who breath it, but in any event if he has exerted sufficient well-directed effort to remove the visible dust it is certain that much of the smaller invisible, and probably most harmful dust has also been removed." (Bonsib, 1937) These general principals of controls for dust hazards in the workplace are noted in other industrial hygiene literature. (Coburn, 1937)

According to Merewether, "The majority of the particles, however, which get into and stay in the lungs are much smaller in each case - up to 5 microns in the case of silica and up to about 50 microns in the case of asbestos. That is to say, that the dust particles which are invisible to the naked eye are the

important ones; this leads us to the practical point that if a silica or an asbestos process produces visible dust in the air, then the invisible dust is certainly in dangerous concentrations." (Merewether, 1938)

According to Cook, "In the case of the asbestos dust conditions, our evaluation of the exposure should be based on the knowledge that the present toxic limit for asbestos is five million particles of dust per cubic foot of air. This is a very small concentration, so small in fact that the condition may look good even to the critical eye and still present an exposure greater than this low limit. … In the case of asbestos dust … the toxic limit is so low that the only safe procedure is to have recourse to actual dust determinations. This is especially important where the injurious condition is not immediately evident but requires years to develop as in the case of asbestosis. … In conclusion it may be stated that in the evaluation of occupational disease hazards in the field, much can be done in spotting conditions which are obviously severe on mere observation of the condition. Where the condition presents some question as to the severity of the exposure, then specialized methods should be utilized as a measure of the degree of the hazard. … Where it is found necessary to institute air analyses or similar technical measurements, the Divisions of Industrial Hygiene of most of the industrial states are available to manufacturers for study of their conditions." (Cook, 1942)

TRANSACTIONS, 32nd National Safety Congress, Volume II, 1943, The Control of Fumes in Shipyards, William E. Lawrence, states that "[t]he use of water repellent asbestos insulation has recently replaced some types of material formerly used in ship work. For protection against dust or possible asbestosis from such material, it is recommended that both on ships and in shops, or where the materials is prepared, it be dampened and that dust respirators be worn, also that special ventilation be provided. Periodic medical examination of those exposed to such hazards is also necessary." (Lawrence, 1943) The control of asbestos dust is additionally mentioned by the Industrial Hygiene Foundation - Industrial Hygiene Digest Literature and News. "The control of asbestosis must be an engineering control because there are no medical means to detect the disease until much harm has been done. Engineering control consists of the two important principles: (1) Adequate exhaust, (2) Good housekeeping." (Industrial Hygiene Foundation, 1943)

The 1951 Walsh-Healy Act implemented regulation for the control of workplace hazards, including asbestos dust, for U.S. Government-related projects. In Section H, Environmental Conditions and

Personal Services, for gases, vapors, dusts, fumes and mists, details the following requirements: (a) guide for allowable concentrations, including 5.0 mppcf for asbestos dust, (b) control measures, (c) personal protective equipment, (d) respiratory protective devices, (e) and air cleaning equipment. (Walsh-Healey Act, 1951)

The hazards of exposure to asbestos-containing products have been well documented in the scientific literature. By the 1930s, asbestosis had been thoroughly documented in the industrial hygiene literature (Merewether, 1930). In 1955, the link between asbestos exposure and lung cancer had been firmly established in public health and industrial safety literature (Doll, 1955). In 1960, mesothelioma occurrence was discussed in previous studies and observed in individuals exposed to asbestos in relation to the mining industry. (Wagner, 1960) In 1965, the link between asbestos exposure and mesothelioma had been firmly established in public health and industrial safety literature (Newhouse, 1965). This was also conveyed by Hueper in 1965: "Since 1935 and increasing amount of epidemiologic, clinical and pathological evidence, moreover, incriminates this health hazard [asbestos] as one of the environmental sources of cancers of the lung … and more recently also of mesotheliomas of the pleura and the peritoneum." In this same document, "The numerous occupations and products associated with the production and utilization of asbestos provide illustration of the wide scope of the industrial health problem related to this mineral. … Asbestos rock mining, loading, shipping, crushing, milling, asbestos spinning, weaving, mixing, cutting, pressing, molding, plastering, cementing, spraying of steel construction, undercoating of automobiles, insulating pipes, etc., clothes, cloths, sheets, blankets, curtains, brake linings, yarns, cords, ropes, twines, ribbons, artificial snow, filler in rubber goods, plastics and roof coatings, filter cloths, filter pads, filter paper, artificial wood, tiles, shingles, cardboards, wall boards, partitions, panels, paper, clutch facings, clapboard, pipe coverings, pipes, insulation blocks, insulation jackets, gaskets, pump packings, electrical wire insulation, structural heat insulation, facings of acoustical building materials, catalyst supports in sulfuric acid and production, putties." (Hueper, 1965)

According to the EPA, "exposure levels below those allowed for asbestos workers, the risk of asbestosis is negligible. Some scarring of lung tissue may appear on X-rays after many years of low exposure, but no impairment of respiratory function is likely to occur. **However**, the incidence of lung cancer and mesothelioma exceeds baseline rates even at very low exposure levels." (USEPA, 1983) {emphasis added} "Avoiding unnecessary exposure to asbestos is prudent." (USEPA, Guidance for controlling, 1985) "While

lowering exposure lowers risk, there is no known level of exposure to asbestos below which health effects do not occur. … Mesothelioma is a type of fatal cancer of the lining of the chest or abdominal cavity. It can be caused by very low exposures to asbestos. This cancer has occurred among brake mechanics their wives and their children.” (USEPA, Auto Mechanics, 1986)

“There are data that show that the lower the exposure, the lower the risk of developing cancer. Excessive cancer risks have been demonstrated at all fiber concentrations studied to date. Evaluation of all available human data provides no evidence for a threshold or for a ‘safe’ level of asbestos exposure.” “This recommended standard of 100,000 fibers >5 µm in length/m^3 is intended to (1) protect against the noncarcinogenic effects of asbestos, (2) materially reduce the risk of asbestos-induced cancer (only a ban can assure protection against carcinogenic effects of asbestos) and (3) be measured by techniques that are valid, reproducible, and available to industry and official agencies.” (NIOSH, 1976) "Excessive cancer risks have been demonstrated at all fiber concentrations studied to date. Evaluation of all available human data provides no evidence for a threshold or for a 'safe' level of asbestos exposure." (NIOSH, Workplace Exposure to Asbestos, 1980) In a 1991 joint EPA and National Institute of Occupational Safety and Health (NIOSH) document, “NIOSH contends that there is no safe airborne fiber concentration for asbestos. NIOSH therefore believes that any detectable concentration of asbestos in the workplace warrants further evaluation and, if necessary, the implementation of measures to reduce exposures.” (USEPA, Building Air, 1991) The U.S. Department of Health and Human Service has found that "Mesothelioma has occurred following short term asbestos exposures of only a few weeks, and can result from very low levels of exposure." (NIOSH, Report to Congress on Worker's Home Contamination, 1995).

OSHA’s overview of asbestos hazard informs that their “Airborne levels of asbestos are never to exceed legal worker exposure limits. There is no ‘safe’ level of asbestos exposure for any type of asbestos fiber. Asbestos exposures as short in duration as a few days have caused mesothelioma in humans. Every occupational exposure to asbestos can cause injury of disease; every occupational exposure to asbestos contributes to the risk of getting an asbestos related disease.” (OSHA, 2018)

“The Commission has noted that in the scientific literature there is general agreement that there is no known threshold level below which exposure to respirable free-form asbestos would be considered

safe." (CPSC - Ban on Consumer Patching Compounds … Containing Respirable Free-Form Asbestos, 16 CFR Ch. 11 § 1304.5, 1977, Ed. Source 42 FR 63362). "The results of numerous measurements indicate that average concentrations of asbestos in ambient outdoor air are within the range of 10^{-8}– 10^{-4} PCM f/mL." (ATSDR, 2001) There is no basis for accepting any workplace or non-occupational exposure to asbestos above ambient background as "safe." The WHO concludes there is no threshold exposure level below which exposure to asbestos dust would be free of hazard to health. (IPCS, WHO, 1998) (WHO, 2006) In a review from Dodson, "[t]he WHO stated that '[T]he human evidence has not demonstrated that there is a threshold exposure level for lung cancer or mesothelioma, below which exposure to asbestos dust would not be free of hazard to health.' The International Programme for Chemical Safety (IPCS) has reiterated this position." (Dodson, 2006)

"Exposures as short as a month may result in disease many years later, because the inhaled dust [asbestos], being mineral, tends to remain in the tissues." (Richmond, 1978) Edge states that "[m]alignant mesothelioma may follow relatively low and sometimes brief exposure to asbestos dust." (Edge, 1978) "Mesothelioma may occur following relatively brief or low-level exposures to asbestos, and most patients lack the histologic features of asbestosis, which is generally associated with heavier exposures to asbestos." Roggli notes from another study that found out of 144 mesothelioma patients, 6% of these patients were exposed to asbestos for less than 3 months. (Roggli, 1995) "A significant excess of mesothelioma was observed for levels of cumulative exposure that were probably far below the limits adopted in most industrial countries during the 1980s." (Iwatsubo, 1998). "There is no evidence of a threshold level below which there is no risk of mesothelioma. Low level exposures more often than not contain peak concentrations which can be very high for short periods of time." (Hillerdal, 1999).

As noted above, OSHA does not consider the current PEL's to be fully protective. "OSHA's risk assessment also showed that reducing exposure to 0.1 f/cc would further reduce, but not eliminate, significant risk." (OSHA FR, 1994) "No safe limit or 'threshold' of exposure is known. Any exposure to asbestos carries some risk to health, and people exposed to low levels of asbestos for a very brief period have later contracted mesothelioma." (USEPA, 1980) Various cancers, including mesothelioma, are known to be caused by asbestos at very low lifetime doses. (USEPA Risk Assessment, 1986) (OSHA Risk Assessment, 1986) (Iwatsubo, 1998) (Hillerdal, 1999) (Hodgson, 2000) (Rodelsperger, 2001) (Goldberg, 2005) (MSHA, Federal Register, 2008) (Hodgson, 2010) (Lacourt, 2014) (Markowitz, 2015)

According to Agency for Toxic Substances and Disease Registry (ATSDR) in 2001, "[t]he results of numerous measurements indicate that average concentrations of asbestos in ambient outdoor air are within the range of 10^{-8} [0.00000001] [to] 10^{-4} [0.0001] PCM f/mL; levels in urban areas may be an order of magnitude higher than those in rural areas. … Indoor air concentrations of asbestos ranged from approximately 10^{-5} [0.00001] to 10^{-4} [0.0001] f/mL in a study of air concentrations measured in a total of 315 U.S. public and commercial facilities." Using the background lowest and highest (ambient) magnitude exposure range of 10^{-8} (0.00000001) to 10^{-4} (0.0001) fiber/mL, and a person's lifetime of 70 years, a lifetime exposure dose to ambient asbestos conditions, and no other asbestos exposure, a dose calculation magnitude range can be determined: 10^{-8} (0.00000001) fiber/mL X 70 years = 7^{-7} (0.0000007) fiber-year/mL; to 10^{-4} (0.0001) fiber/mL X 70 years = 7^{-3} (0.007) fiber-year/mL. The ATSDR further reports estimates of fiber-year/mL for the general population based on assumed exposure criteria for ambient outdoor air concentrations ($2x10^{-6}$ PCM fiber/mL) and indoor air concentrations ($3x10^{-6}$ PCM fiber/mL): 20 m^3/day of air breathed, 70 years of exposure, 10% of time outdoors as **0.000014 fiber-year/mL**; and 20 m^3/day of air breathed, 70 years of exposure, 90% of time indoors as **0.00019 fiber-year/mL**. (ATSDR, 2001) Combining the 10% outdoor with the 90% indoor lifetime dose yields a total lifetime dose of **0.000204 fiber-year/mL** (0.000014 fiber-year/mL + 0.00019 fiber-year/mL). (ATSDR, 2001) A study by McDonald states, "In most industrialized countries, the disease [mesothelioma] has increased much more rapidly in males than females, reflecting the impact of occupational asbestos exposure 30-40 yrs earlier. Backward extrapolation of these trends suggests that, before the diverging pattern began, mortality was about 1-2 per million population in both sexes." (McDonald, 1996) According to Hillerdal, "There might exist a background level of mesothelioma occurring in the absence of exposure ot [sic] asbestos, but there is no proof of this and this 'natural level' is probably much lower than the 1-2/million/year which has been often cited." (Hillerdal, 1999) Other authors have used this 1-2 per million estimate in their own reviews as well. (Iwatsubo, 1998) (Neumann, 2001) (Scherbakov, 2001) (Lemen, 2004)

From an industrial hygienist perspective, asbestos exposures above ambient background levels, as reflected in the literature, is to be avoided and any such exposure may contribute to disease in some individuals. The human respiratory system is not selective as to the source (product) of airborne asbestos during inhalation; therefore, if there actually is a lifetime dose-response relationship for some diseases, any asbestos body burden added by significant exposure above ambient contributes to increased risk of

disease, regardless of the product types, manufacturers, worksites, or exposure averages. If no safe threshold of exposure exists for some asbestos-related conditions, such as mesothelioma, then the conclusion is the same.

5. Asbestos-containing Dust and Resuspension

"Older occupational studies measured dust exposure in units of million particles per cubic foot (mppcf). This method did not distinguish fibrous from nonfibrous particles and used relatively low magnification, so only the largest particles and fibers were detectable. When a more accurate value is not available, it has been assumed that a concentration of 1 mppcf is equal to 3 PCM f/mL." (ATSDR, 2001) Depending on the percentage of asbestos in the product and the force imparted to it, resultant dust will contain varying levels of asbestos. If a dust cloud is visible to the unaided eye, then the airborne concentration is well above 5 mppcf. (Dement Deposition, February 1998) Conversely, airborne asbestos concentrations can be very high even if dust is not visible in the air. "Usually the dust concentration must be from 8-10 million particles per cubic foot before its presence is visible in average lighting conditions." (Union Carbide, 1968) According to a review by Dodson et al., the point at which visible dust would have been visible in mppcf ranged from 10 - 40 depending on the work conditions at hand. (Dodson, 2006) Therefore, at a point at which a person would have visibly seen asbestos-containing dust arising from activities with asbestos-containing products (8 – 40 mppcf), one would have potentially been exposed to 24 f/cc to 120 f/cc.

The presence of visible dust released from an asbestos-containing product represents an asbestos exposure that is at least hundreds of times above highest background/ambient exposure levels (background level being 0.0001 f/cc.) "The results of numerous measurements indicate that average concentrations of asbestos in ambient outdoor air are within the range of 10^{-8}– 10^{-4} PCM f/mL; levels in urban areas may be an order of magnitude higher than those in rural areas." (ATSDR, 2001) There is no basis for accepting any workplace or non-occupational exposure to asbestos above ambient background as "safe."

According to the USEPA, "The aerodynamic behavior of fibrous-shaped aerosol particles is governed by the interaction of opposing forces: a driving force such as is caused by gravitational acceleration, and the viscous resistant of the gaseous medium within which the particle moves." Asbestos fibers are very small

and possess aerodynamic qualities such that the fibers, once released to the air, may remain suspended for hours, and hence remain in the breathing zone of workers and bystanders. "It is of interest to note that for fibers whose diameter is of the order of 0.1µm, gravitational sedimentation occurs at the rate of only a few centimeters per hour, even though their length may be as much as 100µm." (USEPA, 1978) The fibers may be carried by air currents to great distances from the original point of release. Fibers may eventually settle onto surfaces in the work area (either near or far from the release point, depending on air movement), and can be resuspended into the air when the surfaces onto which they settled are disturbed. This repeatable process can lead to very high airborne asbestos exposures. (USEPA, 1978) "Activities which disturb the debris or dust such as maintenance or custodial tasks are likely to re-entrain the asbestos, and this re-entrianment may cause personal exposure to airborne asbestos." (Millette and Hays, Settled Asbestos Dust, 1994)

There are no regulated limits for asbestos in settled dust. The potential for settled dust to create unacceptable exposures to airborne asbestos, however, is recognized by both the U.S. EPA and the U.S. OSHA in their respective regulations, guidance documents, and interpretations. Asbestos is considered an inhalation hazard. Asbestos structures which are airborne in the breathing zone can be inhaled. Important exposure sources include the mining and milling of asbestos minerals, manufacture of asbestos-containing products, handling and shipping of those products, installation of ACMs, removal of ACMs, and disturbance of ACMs during operations and maintenance activities. Asbestos fibers and structures in settled dust can become airborne when the dust is disturbed and thereby pose an inhalation hazard. The resulting air concentrations can be significant. One of the most important sources of exposure related to in-place ACMs is disturbance of asbestos-containing settled dust.

The literature is flush with the hazard potential from asbestos dust. (National Safety Council, 1934-1949) (Bonsib, 1937) (Dreessen, 1938) (Fleischer, 1946) (Fischbein, 1949) (Doll, 1955) (Harries, 1968) (Lumley, 1971) (Sawyer, 1977) (USEPA, 1979) (Baldwin, 1982) (Keyes, 1991) (USEPA, Singer, 1992) (Keyes, 1992) (Ewing, 1992) (Ewing, 1993) (Keyes, 1994) (Hatfield, 1997) (Dodson, 2006)

6. Bystander Exposure

"Bystander" is used in this report to mean any people who are in the vicinity of asbestos related work but not actually themselves manipulating the asbestos-containing products. These can be persons of other

construction trades, laborers, vendors, delivery people, equipment operators, industrial process operators, managers, casual observers, etc. Exposure to airborne asbestos occurs to workers who repair, remove, or otherwise disturb asbestos-containing materials. Exposure also occurs to workers who clean-up asbestos debris and dust. While all of these activities are in progress, exposure to airborne fibers occurs to other people (bystanders) in the immediate vicinity and in some circumstances to people distant from the activities. People who were not directly involved in the manufacture, use, installation, repair, and removal of asbestos-containing products can be at risk. In the repair, renovation, construction, power production and shipbuilding industries it is very common for multiple trades to be working side by side, or in an overlapping manner. This is referred to loosely as sequencing. For example, with regard to installation of asbestos-containing products, it would not be uncommon to see pipe fitters working near pipe insulators; it also would not be uncommon for white collar workers to episodically pass through this aforementioned area as a supervisor. In the course of a blue-collar worker's career it would not be uncommon for him/her to be exposed to varying degrees of airborne asbestos fibers, especially during the height of asbestos use, during the 1950's, 1960's, and early 1970's. (ATSDR, 2001) (Harries, 1968)

According to Selikoff et al., "A particular variety of environmental exposure may be of even greater concern. Asbestos exposure in industry will not be limited to the particular craft that utilizes the material. The floating fibers do not respect job classifications. Thus, for example, insulation workers undoubtedly share their exposure with their workmates in other trades; intimate contact with asbestos is possible for electricians, plumbers, sheet-metal workers, steamfitters, laborers, carpenters, boiler makers, and foremen; perhaps even the supervising architect should be included." (Selikoff, 1964). "Asbestosis and asbestos cancer hazards related to an inhalatory exposure to asbestos exists not only for asbestos workers proper engaged in the direct and regular production, processing, handling, and using of asbestos-containing materials, but also for the large number of individuals who may sustain such contacts on an incidental basis. Such persons may be employed permanently or temporarily in or near operations where asbestos and asbestos products are produced or handled and where they inhale, therefore, air polluted with asbestos dust (repairmen, maintenance men, engineers, mechanics, laboratory technicians, office workers, medical personnel, truckers, railroad workers, yardmen, construction workers, shipyard workers, automobile plant and garage employees, etc." (Hueper, 1965)

According to Selikoff as it relates to the insulation industry, “Neoplasms have also been reported among individuals indirectly exposed to asbestos insulation work, as carpenters, steam fitters, and other building trade workers.” (Selikoff, 1965) Brody reiterated Selikoff’s bystander exposure concept in 1966; “The dangers he said, extend to workers in ‘contiguous trades,’ such as other construction workers and their families.” (Brody, 1966) “First impressions of the problem would suggest that only those men continuously working with asbestos are at risk. In the dockyards these men would be the mattress workers, laggers, sailmakers working with asbestos cloth, asbestos sprayers, and strippers, and storeman. Experience has shown, and further consideration of the industry and processes should suggest, that many other men have been at risk.” In this same 1968 study, asbestosis was discovered in other job classifications like electrical fitter, engineer, and welder. Harries “attempted to show that as an industry the Navy uses large amounts of many different products containing asbestos in varied and difficult working conditions. The work often gives rise to high dust concentrations and many people working near the different processes may be exposed to the hazard. We know that men other than those working directly with asbestos are contracting asbestosis.” (Harries, 1968) “The population at risk includes not only those engaged in the manufacture and use of asbestos products, but also bystanders and others limited to neighborhood or familial exposures.” (Sawyer, 1977) Grandjean and Bach state, “Indirect exposure may occur at work when adjacent workers are exposed to hazards originating from fellow workers’ activities.” (Grandjean, 1986) “While most studies of asbestos and the development of human disease have focused on individuals occupationally exposed, there is an increasing body of evidence that non-occupational exposure, usually called environmental or bystander exposure, can lead to the development of asbestos-related disease.” (Dodson, 2006)

The scientific literature reveals significant exposure to bystanders. (Egan, 1970) (Harries, 1971) (Selikoff, 1972) (Richmond, 1978) (Fischbein, 1979) (Kilburn, 1985) (Lerman, 1990) (Keyes, 1991) (Lilienfeld, 1991) (Ewing, 1992) (Keyes, 1992) (McKinnery, 1992) (Ewing, 1993) (Keyes, 1994) (Millette, 1995) (Millette, 1996) (Hatfield, 1997) (Hatfield, 1998) (Hatfield, US Gypsum Joint Compound, 1999) (Hatfield, Insulating Cement, 1999) (Hillerdal, 1999) (Gorman, 2004) (Dodson, 2006) (Ewing, 2007) Exposure to bystanders can be as high as to people actually doing the work with ACMs (asbestos-containing materials). (Harries, 1971) (Selikoff, 1972) (Keyes, 1992) (Great Britain, 1935)

7. Take Home Exposures

Domestic asbestos exposures and resulting mesothelioma disease was reported in in 1965, “[t]he group of nine, seven women, two men, whose relatives worked with asbestos, are of particular interest. The most usual history was that of the wife who washed her husband’s dungarees or work clothes. … There seems little doubt that the risk of mesothelioma may arise from both occupational and domestic exposures to asbestos.” (Newhouse, 1965) The New York Times mentions that “Dr. Selikoff noted that the dangers of exposure to asbestos dust were not limited to those who work directly with this ubiquitous insulator and filler material. The dangers, he said, extend to workers in ‘contiguous trades,’ such as other construction workers and their families.” (Brody, 1966) Edge states, “Malignant mesothelioma may follow relatively low and sometimes brief exposure to asbestos dust.” (Edge, 1978) “The risk has been documented extensively for certain occupational exposures, and there are reports that asbestos-associated disease also occurs in household contacts of asbestos workers.” (Richmond, 1978) Chen states that “[w]e report this case to emphasize the association of malignant mesothelioma with a very limited exposure to asbestos.” (Chen, 1978) In 1979, Anderson comments on a previous study from 1976 stating that “[a] source of home contamination in individual exposure was postulated as resulting from dust adhering to shoes, hair, and work clothes brought home for laundering. Change rooms and company laundered coveralls were not available at this plant.” This 1979 study also notes that “[t]he observation that nearly one-half of the wives examined had abnormal x-rays is consistent with the hypothesis that the wives would have been most heavily exposed because they were responsible for the laundering of work clothes and resided in the household for the longest period of time.” (Anderson, 1979) Grandjean and Bach state, “Indirect exposure of household members may occur when hazardous substances are carried home (e.g., in the clothing).” (Grandjean, 1986) “Families have also been exposed to asbestos when workers were engaged in mining, shipbuilding, insulating (e.g., pipe laggers and railway workers), maintenance and repair of boilers and vehicles, and asbestos removal operations.” (NIOSH, 1995) “The fibre concentration in domestic exposure might be as high as in occupational exposure. Brushing clothes might give peaks of ≥100 fibres/ml. Ordinary vacuum cleaning is not effective in removing asbestos fibres, which can remain for years in the house and be airborne again whenever disturbed. Thus, domestic exposure is not low exposure.” (Hillerdal, 1999) According to ATSDR, “You can bring asbestos home in the dust on your hands or clothes if you work in the mining or processing of

minerals that contain asbestos, in asbestos removal, or in buildings with damaged or deteriorating asbestos." (ATSDR, 2001) According to Goldberg, "Concern used to be focused on the occupational environment, but it is now recognized that asbestos fibers are widely distributed in the general environment. Persons can be exposed to asbestos in different non-occupational circumstances: living with asbestos workers, with regular exposure to soiled work clothes brought home; environmental exposure in the neighborhood of industrial sources (asbestos mines and mills, asbestos processing plants); passive exposure in buildings containing asbestos." (Goldberg, 2005) According to the U.S. Department of Health and Human Services, "In the past, families of asbestos workers potentially were exposed to high fiber levels from contaminated clothing brought home for laundering. People living in households with asbestos workers were found to have significantly elevated lung burdens of asbestos, often in the same range as found in individuals occupationally exposed to asbestos, such as shipyard workers." (USDHHS, 2011)

Regarding the resuspension of asbestos dust, the movement of a worker in a small unventilated room while wearing a laboratory coat contaminated with Marinite dust resulted in airborne asbestos concentrations ranging from 3.3 to 24.0 fibres/cm^3 (n=3). (Carter, 1970) According to Sawyer in 1977, the laundering of asbestos-contaminated clothing used during asbestos removal work activities in which various levels of dust control measures were utilized, produced a personal asbestos airborne level mean of 0.4 f/cc (n=12), with the highest level recorded as 1.2 f/cc. Stationary monitoring during picking up clothing, loading washer, and loading the dryer produced averages of 0.4 f/cc (n=4), 0.4 f/cc (n=5), and 0.0 (n=6), respectively. Sawyer further comments "[t]he laundry operation was closely monitored as an analog of domiciliary exposure. The data presented show consistently low counts, and suggest that exposure occurs as dry clothing is handled prior to washing. … If this quantitation of exposure is truly representative, then domiciliary malignancies may be the result of low-level exposure." (Sawyer, 1977)

In a 1999 study airborne asbestos exposure from asbestos-contaminated clothing was described. "One set of asbestos containing Kaylo pipe covering was used for contaminating the clothing." Another set of clothing was placed 2 feet from the work area. The section of Kaylo pipe was "cut and broken to create dust and debris" within a period of 10 minutes. Some of the dust and debris was observed to have landed on the clothing and the worker also wiped their hands on the clothing. Afterwards, the study area was decontaminated before the clothing handling and shaking activity. "The study of secondary exposure

from work clothes consisted of shaking and brushing off each of the four items of clothing (2 shirts, 2 pants). The shaking and brushing of each item lasted approximately one minute. After each item was shaken, it was placed inside a washing machine.” This activity altogether lasted 8 minutes. Personal airborne levels of exposure to asbestos were reported as 7.10 f/cc, 9.91 f/cc, 9.31 f/cc, and 8.57 f/cc; Area airborne levels of exposure to asbestos were reported as 9.11 f/cc and 2.06 f/cc. The level of contamination on clothing was reported to be 204 thousand structures/cm^2 and 1.0 million structures/cm^2. (Longo II, 1999) A similar study was conducted in which a piece of Unibestos pipe covering was “cut and broken.” Each shakeout of each article of clothing lasted 1 minute, and the whole process took 7 minutes. Also, airborne measurements were collected during the clothing contamination period. Personal airborne levels of exposure to asbestos while contaminating work clothes were reported as 161.32 f/cc and 134.79 f/cc; Area airborne levels of exposure to asbestos while contaminating work clothes were reported as 7.34 f/cc and 23.78 f/cc. Personal airborne levels of exposure to asbestos while shaking out contaminated work clothing were reported as 10.16 f/cc, 9.07 f/cc, 5.74 f/cc, and 6.90 f/cc; Area airborne levels of exposure to asbestos were reported as <0.01 f/cc and 3.27 f/cc. The level of contamination on clothing was reported to be 289 thousand structures/cm^2 and 347 thousand structures/cm^2. (Longo III, 1999)

In 2000, asbestos exposure was measured while “hand brushing the dust off a shirt and pants” after an electric wire brush gasket removal activity. This hand brushing activity lasted approximately 35 seconds. During this brushing off activity, personal exposure levels ranged from 3.0 to 4.3 fibers/cc (n=4), while areas samples ranged from 0.02 to 0.15 f/cc (n=4). (Hatfield, 2000)

In 2015, a study looked at the “potential for para-occupational, domestic, or take-home exposure from asbestos-contaminated work clothing.” Clothing was fitted onto dummies, put into a chamber, and exposed for 6.5 hours to airborne concentrations of 11.4 f/cc (PCME). This clothing was then collected and subjected to shaking activities. Grade 7T asbestos fibers were “aerosolized in the chamber using a dust generation system … with fans running to assist in airborne mixing.” Mean 5-minute and 15-minute concentrations (PCME) during active clothes handling and shake-out were 3.15 f/cc (1.24 – 6.24 f/cc, n=3) and 2.94 f/cc (1.17 – 5.05 f/cc; n=3), respectively. Airborne asbestos levels decreased post shaking activities, 15 minutes later, by 55%. Of note, neither the clothing fabric type nor its age “appeared to have a significant effect on the overall airborne chrysotile concentrations generated during clothes

handling." (Sahmel, 2015)

These studies do not address other exposure concepts such as, asbestos dust accumulation over time, and re-entrainment of asbestos dust from surfaces (e.g., potential cleanup of dust, other household surface disturbances), asbestos cross-contamination to other portions of a home (and subsequent exposures) or other clothing, and other human to human contact beyond laundering activities (e.g., hugs, transfer of dust to carpet or furniture), but rather focus on the exposure during and directly after laundering activities.

This theme of household or familial asbestos exposure from asbestos contaminated work clothes is described in several other instances. (Kober, 1924) (Gafafer, 1943) (Walsh-Healey, 1951) (Selikoff, 1965) (Kiviluoto, 1965) (OSHA, 1972) (Navratil, 1972) (Hinkle, 1973) (Anderson, 1976) (Anderson, 1979) (Huncharek, 1989) (Lerman, 1990) (USEPA, 1990) (USDHH, 1995) (Bianchi, 2001) (Revell, 2002) (Dodson, 2006) (Dodson, 2012) (Ewing, 2007) (Ferrante, 2007) (D'Agostin, 2017)

8. Fiber Type and Fiber Size

Fiber Type

According to Hueper, "Since, of the different types of asbestos, chrysotile represents approximately 95 per cent of the total asbestos produced, contact with this type of asbestos furnishes the chief cause of asbestos pneumoconiosis and cancer in most countries, and especially in the U.S.A. which mainly produces, imports, processes and used chrysotile. Contact with other types of asbestos, particularly amosite and crocidolite, is of comparatively minor and regional importance for occupational reasons. … The exposure data to be give apply, therefore, mainly, to chrysotile, although according to Lanza, all three types elicit the same kinds of biologic reactions. (Hueper, 1965) ATSDR states, "All forms of asbestos are hazardous, and all can cause cancer, but amphibole forms of asbestos are considered to be **somewhat** more hazardous to health than chrysotile."[1] {emphasis added} (ATSDR, 2001) Some experts contend that fiber type and length are extremely important with regard to potential exposure risk. In discussions about fiber type, OSHA states, "After a comprehensive review of the evidence submitted concerning the validity of the 1984 risk assessment, OSHA has determined that it will continue to rely on the earlier analysis. The Agency believes that the studies used to derive risk estimates remain valid and

reliable, and that OSHA's decision to not separate fiber types for purposes of risk analysis is neither scientifically nor regulatorily incorrect. There are at least three reasons for OSHA's decision not to separate fiber types.

“A. First, OSHA believes that the evidence in the record supports similar potency for chrysotile and amphiboles with regard to lung cancer and asbestosis. The evidence submitted in support of the claim that chrysotile asbestos is less toxic than other asbestos fiber types is related primarily to mesothelioma. This evidence is unpersuasive, and it provides an insufficient basis upon which to regulate that fiber type less stringently.

“B. Second, as stated in the 1986 asbestos standard, even if OSHA were to accept the premise (which it does not), that chrysotile may present a lower cancer risk than other asbestos fiber types, occupational exposure to chrysotile asbestos still presents a significant risk of disease at the revised PEL (See 51 FR 22649, 22652). In particular, asbestosis, the disabling and often fatal fibrosis of the deep portions of the lung, is caused by exposure to all types of asbestos. The evidence on this is strong and no new information has been presented to contradict this. As stated above, OSHA estimated asbestosis risks at 0.2 f/cc exposures as an unacceptably high 5 cases per 1000 workers. Thus, asbestosis risks alone justify the regulation for chrysotile.

“C. Third, the record shows that employees are likely to be exposed to mixed fiber types at most construction and shipyard industry worksites most of the time. Assigning a higher PEL to chrysotile would present the Agency and employers with analytical difficulties in separately monitoring exposures to different fiber types. Thus, regulating different fiber types at differing levels, would require more monitoring all the time and would produce limited benefits (51 FR 22682).” (OSHA, 1994)

As of 2018, OSHA reports that all asbestos fiber types can cause asbestos related disease. (OSHA, 2018) In a letter from the WHO, it is clearly stated that “all types of asbestos cause asbestosis, mesothelioma, and lung cancer.” (WHO, 2006). A scientific Panel appointed by the World Trade Organization found that "on the basis of scientific evidence that 'no minimum threshold of level of exposure or duration of exposure has been identified with regard to the risk of pathologies associated with chrysotile, except for asbestosis.' The pathologies which the Panels identified as being associated with chrysotile are of very serious nature, namely lung cancer and mesothelioma." (WTO, 2001) According to Dr. Richard Lemen,

“We are at a point in the history of asbestos usage where chrysotile is the predominant type asbestos produced and consumed in the world today; it constituted about 98.5% of US consumption in 1992. … A review of 92 consecutive cases of mesothelioma found that even while only 28.3% of the asbestos fiber type in the lung was chrysotile, it was the major fiber type identified in the mesothelial tissue itself. These findings further suggest that lung burden analysis for determining fiber type in mesothelioma etiology may not be appropriate and that determining predominate fiber type in the mesothelial tissue is the more rational determinant.” (Lemen, 2001) Nicholson concludes, “From studies in the United States and Great Britain, chrysotile has been shown to increase the risk of lung cancer and to produce mesothelioma in exposed workers.” (Nicholson, 2001) Other literature express this notion. (Stayner, 1996) (Smith, 1996) (Landrigan, 1999) (Tossavainen, 1999) (Kashansky, 2001) (Shcherbakov, 2001) (Everatt, 2007) (Loomis, 2009) (IARC, 2009) (Beddington, 2011) (Kanarek, 2011) (Markowitz, 2015)

Fiber Size

According to Dodson and his research, the regulated fiber size (≥ 5μm) “selection criteria were based on ‘practicality and theoretical considerations’ rather than having a target of a ‘more toxic’ population of fibers.” (Dodson, 2006) Marr mentions that “researchers also considered fibers greater than 10 microns the most harmful. This is not in agreement with recent studies in South Africa where authorities consider fibers less than 5 microns the most harmful.” (Marr, 1964). According to Sawyer and his research, the “counting of only those fibers 5μm or longer is inappropriate. Airborne fiber sizes range from hundreds of microns to fibrils of submicron dimensions, and the size distribution of asbestos particles in human tissues studied by electron microscopy is in most part less than 5 μm.” (Sawyer, 1977) In a 2001 study, researchers conducted fiber burden analysis in a series of individuals with mesothelioma who were 50 yr or less of age at time of diagnosis. They concluded that “[s]horter fibres were more abundant than longer fibres, and high concentrations of all fibre lengths tended to occur together.” (McDonald, 2001) Dodson agrees that “inhaled asbestos fibers cause asbestos-related disease and most frequently consist of a mixture of asbestos types and sizes.” (Dodson, 2006) According to Suzuki et al., the majority of the fibers in the lung and the mesothelial tumor tissue were less than 5μm in length. (Suzuki, 2002) Suzuki later states “that contrary to the Stanton hypothesis, short, thin, asbestos fibers appear to contribute to the causation of human malignant mesothelioma.” (Suzuki, 2005) Dodson states that “[t]he fact that short fibers (< 5μm) have been shown to produce toxic effects in macrophages in vitro and to be fibrogenic

tumorigenic in animals in vitro, and that they reach the site of mesothelioma development support the inappropriateness of discounting their role in asbestos-related disease as has been done." (Dodson, 2006) In 1980, NIOSH-OSHA commented that, "Chrysotile is as likely as crocidolite and other amphiboles to induce mesotheliomas after intrapleural injections, and also as likely to induce lung neoplasms after inhalation exposures. Human occupational exposures to all commercial asbestos fiber types, both individually and in various combinations, have been associated with high rates of asbestosis, lung cancer, and mesothelioma." (NIOSH-OSHA, 1980)

9. Conclusions

A. According to the above Sections, based on industrial hygiene, scientific, regulatory, and other documents:

B. When asbestos-containing products were installed, removed, cut, manipulated, repaired, or in any way disturbed, workers and bystanders were exposed to significant airborne concentrations of asbestos. Significant contamination of clothing from asbestos occurs during the installation, removal, cutting, manipulation, repairing, or in any way disturbing of an asbestos-containing product.

C. Significant exposure to asbestos is due to the installation, removal, cutting, manipulation, repairing, or in any way disturbing of an asbestos-containing product in such a manner that airborne asbestos fiber concentration is released above background concentration. ATSDR reports asbestos background as a range between 10^{-8} to 10^{-4} PCM f/ml.

D. When the asbestos products were installed, removed, cut, manipulated, repaired, or in any way disturbed, a person, while working with such products or as a bystander, was exposed to significant airborne concentrations of asbestos for each type of product.

E. Airborne asbestos does not settle quickly from the air and can easily become re-entrained after it does settle.

F. Since the 1930's, working with or around hazardous contaminants in the workplace, the need for engineering controls, appropriate training, or appropriate respiratory protection was recommended.

Asbestos was included among these workplace hazards. Good industrial hygiene practices would have included warnings.

G. The concepts of appropriate engineering controls, appropriate training, and appropriate respiratory protective equipment, working in concert, will reduce exposure to airborne asbestos.

H. The dangers of exposure to asbestos-containing products have been well documented in the scientific literature. By the 1930s, asbestosis had been thoroughly documented in the industrial hygiene literature (Merewether, 1930). In 1955, the link between asbestos exposure and lung cancer had been firmly established in public health and industrial safety literature (Doll, 1955). In 1965, the link between asbestos exposure and mesothelioma had been firmly established in public health and industrial safety literature (Newhouse, 1965).

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APPENDIX G

Table of Contents

Background

Mr. James Benjamin LaFrentz was born November 24, 1944, in Austin, Texas (Vol. I, Pg. 22, 24) (Vol. II, Pg. 126). He graduated high school in 1963 (Vol. I, Pg. 36). He attended Southwest Texas State Teachers College for one year (Vol. I, Pg. 40). Mr. LaFrentz was diagnosed with mesothelioma in 2018 (Vol. I, Pg. 102, 104). Medical information (Vol. I, Pg. 102-111, 139-146, 149-150, 156-158) (Vol. II, Pg. 11-27, 41-44, 97, 101-102). Mr. LaFrentz started smoking in 1959 and smokes currently (Vol. I, Pg. 146-147).

Mr. LaFrentz's first wife, Jacelyn, married in 1966, was a stay-at-home mother after 1966; however, from 1966 to 1970 she ran a daycare out of their home; smoker. She died in 1999 (Vol. I, Pg. 29-30, 152-154) (Vol. II, Pg. 97-99). He is unsure if Jacelyn used baby powder or not, but she might have (Vol. II, Pg. 100).

Mr. LaFrentz married his second wife in 2001; smoker (Vol. I, Pg. 35, 154). Mr. LaFrentz's father was a civil engineer and designed secondary roads, working for the Texas Highway Department, when Mr. LaFrentz lived with his parents; "I know he went out to the sites on occasion … all over Texas" (Vol. I, Pg. 25-26). Mr. LaFrentz's mother was a stay-at-home mother when he lived with his parents (Vol. I, Pg. 26). Mr. LaFrentz's older brother, by 10 years, was a chemical engineer in life. When living at home, his brother worked as a grocery clerk during the summer (Vol. I, Pg. 27).

After he and his first wife were married, they moved to Ohio in 1978, for several years, to help his wife's stepfather on his farm, until they oved back to Texas in 1978 (Vol. I, Pg. 44, 47).

Mr. LaFrentz mentions woodwork personal woodwork that he has enjoyed, off and on, since high school (Vol. II, Pg. 49, 51-53). Mr. LaFrentz describes hobby welding work starting 10 year prior the deposition, 2005 (Vol. II, Pg. 49). Mr. LaFrentz describes his shop at his residence currently (Vol. II, Pg. 50-51).

Other family background information (Vol. I, Pg. 28-29, 31-32). Mr. LaFrentz is shown information in exhibits D3, D4, and D5; items D3, D4 and D5 he had not reviewed prior to deposition (Vol. II, Pg. 32-37).

Mr. LaFrentz believes that his family may have used talc products, but he is unsure if his wife used talc products on the kids or on herself; he assumes she did. He is unaware of the brand names of products (Vol. II, Pg. 87, 103).

Throughout his career he does not recall wearing heat resistant clothing, and any gloves worn, would have been leather (Vol. II, Pg. 145). He does not know what heat resistant blankets are (Vol. II, Pg. 146). Throughout his career, he does not recall ever seeing asbestos abatement work (Vol. II, Pg. 160). Mr. LaFrentz is not aware of the name Hitco Carbon Composite (Vol. II, Pg. 171). Mr. LaFrentz is not aware of John Crane products or John Crane packing (Vol. II, Pg. 174). Mr. LaFrentz is not aware of the name Harco Laboratories or Harco products (Vol. II, Pg. 175-176).

Regarding what Mr. LaFrentz knows today, about asbestos exposure, "there's several different sources [of asbestos exposure] that possibly. I can't turn around and say for sure, but I was around dust in a joint compound, there at GD with these drilling of these panels, and I have no idea how much else or wherever else asbestos was at the time. I -- that was not really a source of concern at that time" (Vol. II, Pg. 179).

Residences

Mr. LaFrentz currently lives in at 113 County Road 3198, Decatur, Texas, moving in on June of 2003 (Vol. II, Pg. 44, 126). Mr. LaFrentz's prior residence was located at "5773 FM … 20 – 2123 … in the area of Cottondale … a double-wide", residing there since June of 1980. It took 45 minutes to drive to his work at Air Force Plant Number 4. The double-wide was built in 1980, custom built (Vol. II, Pg. 44-45, 47). Prior to this address, Mr. LaFrentz lived in a one-story house close to River Oaks Boulevard for about 6 months. He does not recall renovation work with walls or sheetrock (Vol. II, Pg. 47-48). Prior to this address, Mr. LaFrentz lived in a completely remodeled one-story rent house in Fort Worth or White Settlement in 1979 but does not recall the address. This address was a few miles from Air Force Plant Number 4. He does not recall renovation work with walls or sheetrock (Vol. II, Pg. 45-48). In 1960, Mr. LaFrentz lived at 5003 Valley Oak Drive in Austin, Texas; one-story, built in 1950 (Vol. II, Pg. 77-78).

High School Summer Work

Regarding his high school summer work, "[o]ne year I cleaned up construction sites. One year I worked as an apprentice steamfitter, and one year worked with the Texas Highway Department on the road crew", in 1960 or 1961. "Every summer was different" (Vol. I, Pg. 35-36, 184) (Vol. II, Pg. 60-61).

Regarding his high school one summer of commercial remodeling construction cleanup work, Mr. LaFrentz cleaned up sheetrock, lumber, and trash. He does not know if he was exposed to asbestos during this work (Vol. I, Pg. 37-38) (Vol. II, Pg. 54). He does not recall wearing a mask during this summer work (Vol. II, Pg. 69). For this one summer, he worked at one site, a strip mall, in South Austin, consisting of 8-10 stores, but he only worked in one store, "[s]trip mall. Just looked like a strip mall with a bunch of storefronts, and one was being redone and that was the one that we were working in. There was -- I don't know. I was clean-up guy, so I wasn't privy to any information about anything" (Vol. II, Pg. 59-61, 73). He worked 8-5pm. (Vol. I, Pg. 188) (Vol. II, Pg. 65). Mr. LaFrentz recalls other tradesmen onsite, such as framers, carpenters and sheetrockers (Vol. II, Pg. 61-62, 69, 71). In general, he recalls construction this construction area as dirty (Vol. I, Pg. 190). He recalls others **mixing joint compound** "around [him]"; they would dump the bag into a bucket or hopper before mixing it with water, and this created visible dust "[t]o a certain extent … I was -- I was in the vicinity. I don't know that I actually got up close enough to smell it and breathe it", but believes so (Vol. I, Pg. 186) (Vol. II, Pg. 67). He recalls the joint compound came in 25lbs bags and contained white powder, but he does not recall a brand name (Vol. I, Pg. 184, 185-186, 191) (Vol. II, Pg. 69-70). Mr. LaFrentz recalls other workers "…**applying** it [joint compound] with the tape when I was in the area with them" (Vol. I, Pg. 189) (Vol. II, Pg. 62-63). He recalls being around workers **sanding drywall** joint compound, 10-20 feet. Sanding was done with a sanding block. Sanding joint compound created visible dust, and he assumes that he breathed this dust (Vol. I, Pg. 183-184, 189-190) (Vol. II, Pg. 64-65, 67). He does not recall the brand name of joint compound used (Vol. I, Pg. 184). A portion of his cleanup time onsite involved **cleanup after joint compound work** (Vol. I, Pg. 190-191). He recalls that he would sweep up with a broom and cleanup at the end of the day, including joint compound dust. If sweeping was conducted quickly, it created visible dust, but he is unsure if he breathed dust during sweeping and cleanup activities, but assumes so (Vol. I, Pg. 187-188) (Vol. II, Pg. 67-69). He used a horsetail or straw broom for sweeping (Vol. II, Pg. 66-67). A part of his cleanup duties was picking up empty bags of joint compound (Vol. II, Pg. 64, 66). He recalls cleaning up the construction

site most of the work day, "[w]ell, I kept cleaning up off and on during the day, so by go-home time pretty well had it all cleaned up", "[o]ff and on I was cleaning up outside and cleaning up inside" (Vol. I, Pg. 188) (Vol. II, Pg. 66). He would have possibly cleaned up flooring material, but not roofing or insulation material (Vol. II, Pg. 135). Additionally, he believes he spent one day cleaning up at a **residential home**, "whatever the carpenters threw down or tore out, I picked up and hauled out to the dumpster" (Vol. II, Pg. 54).

Regarding his high school one summer of steamfitter work in the early 1960s, "I helped one guy. We were redoing piping in the basement of an unoccupied hospital … Luling, Texas … Mainly just apprentice. Put goop on pipes and screw them in and all the old pipes out …". This involved removal of old pipe. He believes he was a member of a pipefitter union, during this time, as an apprentice. This project took 8-10 weeks during the summer, 8-5pm, and their workspace was exposed to the outside through removed walls (Vol. I, Pg. 38, 167-168, 171) (Vol. II, Pg. 56, 73, 136). The pipe goop was "…like, a pipe dope … When I put the pipes back together, I put this goop around the threads and then screw it in and tighten it as tight as I could get it." This dope material came "moist" (Vol. I, Pg. 176, 180). He did not, or does not recall, installing pipe insulation on new piping (Vol. I, Pg. 180-181) (Vol. II, Pg. 58-59). "I was to go get them and clean them up and haul them off type apprentice … There was pipes, there was some other boards, you know, stuff like that" (Vol. I, Pg. 167). Regarding piping and or possible piping insulation removal, "I don't remember if we ever even took the insulation off … As best I remember. It was just old pipes, wanted to get them out … [using a] monkey wrench" (Vol. I, Pg. 168-169) (Vol. II, Pg. 136). He describes his work area as dusty and dirty (Vol. I, Pg. 170-171, 173-174). He does not recall descriptions of insulation and working with this material (Vol. I, Pg. 170-171, 174). He does not recall removing gaskets during piping removal, but he is not sure; he does not recall scrapers or wire brushes; he did not install gaskets, and does not recall if other installed gaskets, because "the ones [new piping] I dealt with were machine threaded" (Vol. I, Pg. 172, 178). He does not recall being informed about the hazards of asbestos from the union (Vol. I, Pg. 175). He doesn't recall cleaning up the floor every day, "[w]e may have sometimes, but I don't really remember any big clean-up on the floors. These pipes were, like, chest high, so you really didn't worry about what was on the floor … I don't remember going through a, like, end-of-the-day, clean-your-workstation type thing" (Vol. I, Pg. 177). Regarding other tradesmen at

this work location, “[t]here could have been [on the first and second floor]. Where we were, the area we were working in [,the basement], was just the two of us (Vol. II, Pg. 58).

Regarding his high school one summer of Texas Highway Department road crew work, he “…acted as a grunt …We threw out the patched highways with asphalt. We cleaned brush, picked up trash (Vol. I, Pg. 39) (Vol. II, Pg. 73-74). He personally worked with asphalt patching (Vol. II, Pg. 74). Patching with asphalt is not a dusty process (Vol. II, Pg. 74). He recalls other workers 10 feet away digging up road to prepare the road for asphalt, “[s]eemed like that they would use a bar with kind of a chisel on one end or they'd use a shovel or I think one time they used a pickaxe … Not really. It was all outside, so, I mean, the wind would blow dirt and dust up, and as far as the -- doing the job, it's -- it was not a dusty job” (Vol. II, Pg. 74-75).

Army National Guard (1964-1970)

Mr. LaFrentz enlisted into the Army National Guard in December of 1964, until 1970 (Vol. I, Pg. 50, 181) (Vol. II, Pg. 86, 139). After boot camp training Mr. LaFrentz went “…into a quartermaster’s unit … which is dealing with food and rations” (Vol. I, Pg. 50-51). He then got involved with helicopter mechanic work in out of Camp Mabry in Austin, Texas (Vol. I, Pg. 51) (Vol. II, Pg. 176). “And then we moved to Bergstrom Air Force Base … And that wasn't Bergstrom. It was the Austin City Airport” (Vol. I, Pg. 51).

Regarding his helicopter mechanic work, “I went to basic training in '67 and started off as a quartermaster, and then before I got back home, I got transferred to a helicopter mechanic at the 322nd Aviation Wing there in Austin, I believe – remember … The agreement was that they weren’t sending me back to school, it would be OJT” (Vol. II, Pg. 139-140). He would report one weekend a month to the 332nd Aviation, and report for two weeks to Fort Hood (Vol. II, Pg. 140). He first worked on a helicopter in July of 1967, until they moved to Ohio, in 1970 (Vol. II, Pg. 140). Regarding his hands-on work with helicopters, “[o]ne of the biggest was changing oil and then safety wiring the bolts back together after you cut them loose … putting the safety wire back on the bolts [due to vibration] … After a while when I was being trained and got promoted, then I was qualified to tape the rotors, and then later on I got promoted again and became a tech inspector. I had to go fly on the helicopter. I had to inspect it before it was released after anything was done to it, and then I had to fly on it with its initial flight.” (Vol. II, Pg.

141, 177). He recalls cutting wire when working removing bolts, and the wire came in spools of a hundred feet (Vol. II, Pg. 177-178). His tools were "[w]renches, needle nose pliers, buckets for the oil, screens for the oil, and I guess that's about it. We -- we were not a major overhaul unit. We just maintained them" (Vol. II, Pg. 142-143). "The ones that we had were H model and D model Hueys, and we had some OH23s and OH13s"; some of the helicopters were received from combat (Vol. II, Pg. 141-142). Any major engine work was sent elsewhere (Vol. II, Pg. 143). Regarding taping the rotors, "[w]e had a long stick that had a -- like a U on the top of it that we put some kind of soft cloth tape from one side of this U to the other. Then we would turn around and take one rotor and use a black grease pen. We would take the other rotor and take a red grease pen, and then we would run up the engine and get the blades flat and walk up and gently, gently touch these strips to the tips of the blade. And when we took it down, we could see if the blades were being matched, that they were both going across the same thing" (Vol. II, Pg. 180). The tape was a white cloth and he doesn't recall the manufacturer, "[i]t was just -- it came on a roll and we just strung it out in between this kind of U-shaped part of the top of the pole" (Vol. II, Pg. 180-181).

Army Reserve (1971-1972)

Mr. LaFrentz continued his military service while in Ohio, the first year he arrived, for "a little over a year", 1971-1972 (Vol. I, Pg. 52, 181-182). "And joined there, and because of my construction background stuff, they sent me out one summer camp, a two-week camp, as the supervisor of a construction unit", in La Crosse, Wisconsin (Vol. I, Pg. 51-52, 182). On the weekends nothing no construction occurred, but "[o]ver that two-week summer camp, we went to La Crosse, Wisconsin and built a little cabin up there … from pad up … [while Mr. LaFrentz was on the construction site] [t]hese guys were pretty skilled, knew what they were doing. I was kind of a go-fer." (Vol. I, Pg. 182). He does not recall if they installed drywall or paneling (Vol. I, Pg. 183).

Safeway

While attending college, Mr. LaFrentz worked as a meat cutter for Safeway, before getting his draft notice in 1964 (Vol. I, Pg. 41).

Stereo Work

Regarding Mr. LaFrentz's stereo work, he worked "…for a company that installed eight-track stereos in cars … a couple of years … '67 through '70" (Vol. I, Pg. 42).

Mr. LaFrentz worked for the Texas State Highway another time, "…installing two-way radios systems in the trucks of the district supervisor" (Vol. I, Pg. 44).

Mobile Home Company (1970)

While living in Bryan, Ohio, in 1970, Mr. LaFrentz worked for a **mobile home company** that built mobile homes, for about a year or a year and a half (Vol. I, Pg. 45-46) (Vol. II, Pg. 86-87, 89). "I did plumbing, ran waterlines, helped with drywall. I cleaned up the area. I had experience doing a lot of these things, so that's why they used me more so than just a clean-up guy" (Vol. I, Pg. 46). "We were building mobile homes, of which they would bring a basically trailer base, which is a frame with tires on it, and we would build a single-wide or a double-wide unit up off that frame. The walls outside, a roof, inside, plumbing" (Vol. II, Pg. 88). The construction location was open land (Vol. II, Pg. 89). He worked on various models of mobile homes (Vol. II, Pg. 88-89). He did not perform drywall work (Vol. II, Pg. 89). He laid vinyl or linoleum flooring, "the floor was wood … And we just rolled out over it and staple gunned it down and cut off any excess." He would cut the excess flooring with a knife. He does not recall dust being produced from flooring cuts (Vol. II, Pg. 90-91). Mr. LaFrentz installed bathrooms, showers, bathtubs hooked up water, and used "standard silicone" to apply to cracks. He recalls installing cork gaskets for faucets (Vol. II, Pg. 91-92). He recalls using "pipe dope or goop" for pipes, "you always put … a little pipe goop or dope or tape" (Vol. II, Pg. 92). Mr. LaFrentz would clean up his own work area with a broom close to the time of inspection, "Pieces of vinyl that you cut when you're laying the floor or pieces of PVC pipe that you cut hooking it together to an elbow", in a then enclosed space, creating a "little" dust, that he breathed (Vol. II, Pg. 94-95). He recalls other trades working on these mobile homes, such as carpenters and roofers (Vol. II, Pg. 93). He was around when other workers installed insulation between walls, "the stuff between walls?" (Vol. II, Pg. 145-146). These mobile homes were heated with a gas panel heater or "…a gas under-the-floor type heater that had a grate in the floor" (Vol. II, Pg. 144).

Aero Corporation, Ohio (1971-1972)

While living in Ohio, Mr. LaFrentz worked for Aero Corporation starting in 1971 or 1972, until he moved back to Texas in 1978 (Vol. I, Pg. 46) (Vol. II, Pg. 95). The facility was half the size of the Air Force 4 Plant (Vol. II, Pg. 95-96). “I was a lathe operator … I started off in a milling machine and worked there for a little while and then got promoted to a lathe operator” (Vol. II, Pg. 95). Mr. LaFrentz was a machinist, and “…ran a mill, a lathe”, working in the machine shop area (Vol. I, Pg. 47). “Most of the prod -- excuse me. Most of the products that we did were air tools. Tools that were run by air that -- used in surgery. Tools that were run by air that are used in everyday workshop … Pretty much just precision air tools” (Vol. I, Pg. 47).

US Air Force Reserves (1978-1991)

Mr. LaFrentz continued his military service when moving back to Texas, starting in 1978, retiring in 1991 (Vol. I, Pg. 52, 159). “For the -- for the first two [or about three] years I was a machinist … And then I transferred and was accepted in intelligence … And I finished my career, ten years, with the Air Force Intelligence” (Vol. I, Pg. 53, 163). He performed military briefing work (Vol. I, Pg. 54-55). After retiring from the military in May of 1991, Mr. LaFrentz accrued 21 years of service, and retired as a Tech Sergeant from the USAF reserves (Vol. I, Pg. 158).

While a machinist, he worked at Carswell Air Force Base (Vol. I, Pg. 163). As a machinist, Mr. LaFrentz “…ran a lathe. We got called on to go out and take screws out of the panels in the aircraft, and they were buggered up and we'd go out and extract them … That was right in the transition period that we had the Thunder Chiefs going into the F-4s” (Vol. I, Pg. 163-164). The panels were “[a]nything that had a buggered-up screw on it on the aircraft … took the screws out of the panels and put brand new screws in” (Vol. I, Pg. 164).

Duties and other service information described (Vol. I, Pg. 159-163).

Fort Worth Company (1978)

Moving back to Texas, Mr. LaFrentz worked for a company in Fort Worth, TX., for about a year (Vol. I, Pg. 48, 121). He worked as a lathe operator at this location. “We took big round blocks of metal … looked like a donut. An we mounted it on our lathe and flattened it out on top and bottom and then rounded the edges and then rounded the inside” (Vol. I, Pg. 49).

General Dynamics (1978 or 1979 to 2005)

Mr. LaFrentz worked for General Dynamics, from 1978 or 1979 to 2005, probably in 1979 in January (Vol. I, Pg. 54-55, 121-122). General Dynamic was located on the runway of Carswell Air Force Base, “I’d heard they were hiring buildup for the F-16”; “Air Force Plant Number 4” (Vol. I, Pg. 55, 115-116, 127). Lockheed later bought out General Dynamics (Vol. I, Pg. 98, 113-114). They were manufacturing F-16 aircraft at this General Dynamics plant in Fort Worth, Texas (Vol. I, Pg. 57). Also, they were “…finishing up on the last F-111s … and going into production on the F-16” (Vol. I, Pg. 58, 116-117) (Vol. II, Pg. 52-53). Aircraft was assembled in Air Force Plant Number 4 (Vol. I, Pg. 116). The USAF was the primary customer of General Dynamics (Vol. I, Pg. 58). He believes 16,000 employees worked at General Dynamic when he was first hired (Vol. II, Pg. 148). The two-story facility was L-shaped and he believes one side of the “L” was one mile long with the thin part of the “L” being 300 yards (Vol. II, Pg. 149). The ceiling was 100-150 feet high (Vol. II, Pg. 148). He recalls Bobby Powell as a supervisor (Vol. I, Pg. 58). He recalls General Dynamics had a medical department (Vol. I, Pg. 96), He recalls being given a physical when starting his work at this location, including x-rays. He does not recall subsequent x-rays (Vol. I, Pg. 96). He recalls hearing tests for noise and has results from that testing (Vol. I, Pg. 98, 122). Mr. LaFrentz worked all over the plant during the course of his work for General Dynamics (Vol. I, Pg. 115). Mr. LaFrentz recalls a co-worker, Mr. Grifka or Griffie and Jeff Fisher (Vol. I, Pg. 118-119). Mr. LaFrentz also retains other company documentation (e.g., pay raises) (Vol. I, Pg. 122). Mr. LaFrentz does not recall interacting with USAF industrial hygiene or safety persons (Vol. I, Pg. 124). Mr. LaFrentz as a member of the International Association of Machinists and Aerospace Workers union while for a few years at this work location and left the union when he ceased being a machinist and went into intelligence. He does not recall the union mentioning hazards regarding asbestos (Vol. I, Pg. 164-166). The lunch area was about 100 feet away in a separate open area. Smoke breaks occurred outside (Vol. II, Pg. 107-108). Mr.

LaFrentz's son worked at General Dynamics in the mid-1990s, in the model machine shop, building models for wind test; his son primarily worked with metal (Vol. II, Pg. 129-131). He does not recall asbestos mentioned when first hired (Vol. II, Pg. 148).

His first position onsite was as a "…**drill press operator** in the … parts fab department" from 1979 to 1981 or 1982, or 3 years (Vol. I, Pg. 58-59, 82) (Vol. II, Pg. 146-147). He worked with 30-40 co-workers in this area (Vol. I, Pg. 59) (Vol. II, Pg. 150). The pre-fab shop was about 200'x200' space, and there were no partitions separating his work from others work and had a shed roof over it about 60 feet high (Vol. II, Pg. 149-150, 155). Regarding ventilation, "[w]e had, like, individual fans, but we also had the -- I used to call it like a[n industrial] fan up above us up in the ceiling area. Kind of a ventilation type fan." He does not recall a comfortable conditioned workspace (Vol. II, Pg. 155). Regarding his work in this position, "[b]asically anything that needed to be drilled, I would drill it. I drilled speed brakes out of raw aluminum. I drilled coupons for testing. I drilled mostly anything … What we called a coupon was a -- came in three different varieties that I'm aware of. One was the honeycomb … One was a panel and one was a strip, and these were -- the panels were composite material on top of a metal plate, and then they were -- we drilled four corners so they could stretch them and see what it took to break them … The strip was a -- basically the same thing, but it was just more or less composite-type material … that we drilled at each end for them to test" (Vol. I, Pg. 59-60) (Vol. II, Pg. 150-151). He drilled holes into many types of items such as aluminum, speed brakes, steel, and brass parts; drilling aluminum was common (Vol. II, Pg. 152-153). Speed brakes came from the molding factory (Vol. II, Pg. 153). "The supervisor generally would say, hey, you're working coupons, you're working speed brakes, you're going to work this, and you're going work that, and we'd go over -- after we got our instructions, we'd go over to the parts bin and get the bin of what we were going to do that day, haul it -- haul it out on the floor to our workstations and go get the fixtures, if it had a fixture, and then get those locked down on our tables and start working" (Vol. II, Pg. 154). **Coupons, panels, honeycomb and strips** are all one and the same. He believes these items consisted of "[s]ome kind of bonding surface, I guess, because they were trying to test the strength of it" (Vol. I, Pg. 131) (Vol. II, Pg. 114, 147). He does not know who supplied the component parts that made up these panels (Vol. II, Pg. 170). Mr. LaFrentz believes these panels were manufactured "in-house" at the Fort Worth plant of General Dynamics (Vol. II, Pg. 183). "…a **honeycomb panel** had a – pretty much quarter inch of material across the top and then a wafered-type center and

then this panel or this same type of composite material on the bottom … eight by ten by inch and a half, inch and a quarter thickness, and then we also used a hole saw and drilled out some wafers …"; he does not know the composition of the composite material (Vol. I, Pg. 131-132). "The **panels** were about, like, eight by ten by about, oh, give or take 5/16ths thick." He does not know the composition of this material (Vol. I, Pg. 133). "They [**strips**] were probably 11 by one and a half by the thickness. Three-quarter -- or a little less than half an inch … These were panels that we cut in strips. They originated in a panel, eight by somewhere about ten and whatever, and these were just strips that were cut from them." He does not know the composition of this material (Vol. I, Pg. 134). Strip panels were "yellow-ish" but could be different colors, and they had different textures sometimes (Vol. II, Pg. 119-120). Coupons, panels, and honeycomb looked similar throughout the time he worked with these materials (Vol. I, Pg. 133). "GD employees built it [coupons], tested it, and reported it [to the USAF]." GD engineers performed the tests, "I was in the area that this test were -- where they put them in on two pins, had a machine and it pulled them apart until they broke" (Vol. I, Pg. 134-135). Panels or coupons were "test panels" for combat aircraft (Vol. I, Pg. 116). "These were test panels that were sent to the engineers that later on in special programs, then I actually found out what these -- where they were and what they were doing with them … And that they were trying to pull them apart for strength tests" (Vol. I, Pg. 125-126). He recalls Bobby Powell as his supervisor when he was a drill press operator (Vol. I, Pg. 77). B.J. Hallstein was the safety engineer (Vol. I, Pg. 83). He recalls 30-40 other workers in the parts fab department (Vol. I, Pg. 87). He recalls 30-minute safety meetings every Friday or Monday morning, but he does not recall discussions about asbestos (Vol. I, Pg. 95). His uniform was blue jeans and a t-shirt, usually; no uniform (Vol. II, Pg. 151). He wore goggles and an apron, when needed (Vol. II, Pg. 151).

Regarding the **coupon or panel drilling work**, "I -- varied times I might have a – they would bring them out in a plastic bin … And there may be 20 or 30 or so in that bin. I might have to do this for two days. I might have -- not have another bin come out for a month" (Vol. I, Pg. 65, 68) (Vol. II, Pg. 157). Mr. LaFrentz did this coupon or panel work off and on for "[a] little over three years probably" while he was a drill press operator and in no other position later (Vol. I, Pg. 66, 129) (Vol. II, Pg. 158). He only did this type of coupon drilling work as a drill press operator (Vol. I, Pg. 66). Drilling two holes in a single strip, plus "cleanup" could take 30-45 minutes, from start to finish (Vol. I, Pg. 66). "I would have to say that over a three-year period, maybe a thousand of them [panels that he drilled] … I know there was quite a

few"; "I would have to -- I don't – I didn't keep a count of it, but I'd have to say over the period -- that three-year or so period, that I probably drilled a thousand or more panels … A thousand or more panels. Panels, coupons, whatever you want to call them"; "at least" a thousand panels; "I know I did tons of them" (Vol. I, Pg. 67) (Vol. II, Pg. 113, 165-166). He drilled all the way through the coupons or panels (Vol. II, Pg. 164-165). Every time he worked with a coupon or panel; the same work practices occurred (Vol. I, Pg. 74). Panels and coupons are the same thing, according to Mr. LaFrentz (Vol. I, Pg. 68). "If it was a larger panel, which would be something about the size of a piece of paper, it had four holes and it had a fixture. In GD [General Dynamics] we had fixture for everything" (Vol. I, Pg. 68). Regarding dust produced during drilling, "[y]es, very much so. Very, very dusty because I could not use any kind of solution on this -- these test panels … I saw it with my own eyes and I had to wipe it off my own face … Smelled like something was burning up. Stunk very bad" (Vol. I, Pg. 69-70) (Vol. II, Pg. 106, 166-167). Honeycomb panels and regular panels required 4 drill holes; strip panels required two holes (Vol. II, Pg. 114-116). After drilling work, **Mr. LaFrentz used a belt sander**, "[t]hey were always leaving, like, burrs around the hole [from the drilling] and the engineers wanted them smooth so they could test them, put them on the pegs. So I would have to take and either use the little belt sander we had there to kind of run over it or use the air hand sander. Had a little disc pad on the end of it … And sometimes I used the whirligig … That's just a little handle that you whipped around and around inside the hole that --"; "I used a small, like, one inch belt sander on occasions. If it was really burry and all, I would use a hand drill, air powered with a right angle on it and a two-inch disc to clean it up, and then the final step was to take a whirly-gig and run it inside of it to clean up all the edges" (Vol. I, Pg. 70) (Vol. II, Pg. 116-117, 157, 167). Sanding most panels would take 15-25 minutes (Vol. II, Pg. 118). Regarding dust produced from sanding and finishing the panels or coupons, "It stunk and created a lot of dust", and this dust was visible. He breathed this dust (Vol. I, Pg. 71) (Vol. II, Pg. 168). After sanding, he would "…put that one [coupon or panel] in the little plastic bin, picked up the next one" (Vol. I, Pg. 73). Mr. LaFrentz would have a "massive **cleanup**" after his coupon or panel drilling work (Vol. I, Pg. 74). "After I got through the -- with the complete job that was in that little plastic bin, eight, ten, 12, 14 parts, something like that, after I cleaned them all up and everything I took that bin and walked it over to the finished rack and then went back and proceeded to clean up the fixture so I could go put it away and clean up my worktable and the floor around it" (Vol. II, Pg. 118-119). "Well, I would have to turn around and get a -- kind of a desk brush. A long-handled brush about that long and brush all my desk off and brush the

fixture off and then sweep up the floor and clean it up, and then on occasion some of the stuff would be stuck in the fixture so I'd have to get the air hose out and blow the air hose over the fixture to clean it up” (Vol. I, Pg. 88). It could take Mr. LaFrentz 30 minutes to an hour to cleanup his work areas after panel work, depending on how many panels he worked with (Vol. II, Pg. 119). Regarding the dust produced from cleanup, “[i]t stirred up the dust a little bit”, and this dust was visible; visible dust was also produced during the use of compressed air (Vol. I, Pg. 89). Mr. LaFrentz wore a **dust mask** during coupon or panel drilling, and cleanup work, “[a] dust mask, but it didn't completely take it out because I always had to go wash my face” (Vol. I, Pg. 73, 78, 80-81, 90). He always wore a dust mask when he had a bin of coupons or panels to work with (Vol. I, Pg. 81). The dust mask came from the parts man (Vol. I, Pg. 73). Mr. LaFrentz is not aware of a General Dynamics policy requiring him to wear a mask when performing coupon or panel work (Vol. I, Pg. 75). He does not believe he wore a mask the first time he performed coupon or drilling work because he “…didn’t realize how dusty and smelly it was going to be” (Vol. I, Pg. 74). “Probably the first maybe couple of strip panels I didn't have anything [a mask], and when I saw what kind of dust it was producing, I talked to my supervisor and told him that I -- can I wet this down, and if I remember right, it took two or three days to get an answer back, and the answer was no. So I had to drill them and cut them dry.” He believes he didn’t have a mask the first week (Vol. II, Pg. 105-106). Regarding the parts man, “He took a paper mask out … of a four by four by six carboard box ad handed it to me.” (Vol. I, Pg. 77-78). He recalls other employees complaining about the dust and smell produced from coupon or panel work activities. He does not recall these co-workers wearing a dust mask when Mr. LaFrentz performed his coupon or panel work (Vol. I, Pg. 75, 88). Mr. LaFrentz recalls the mask box had “3M dust protector … [model or style number] 8710”, and he only wore this mask brand and model (Vol. I, Pg. 78) (Vol. II, Pg. 104). “It [the paper mask] was kind of whitish-gray with yellow bands on it … run across your nose” (Vol. I, Pg. 79). Mr. LaFrentz did not have facial hair when he wore the dust mask (Vol. I, Pg. 78-79). Regarding Mr. LaFrentz’s impression of the paper dust masks effectiveness, “I'm not aware whether it was or not. I know I had a lot of black soot on my face underneath the mask … when I took the mask off, I’d still … I’d have, like, ash inside the area where the mask was going to cover” (Vol. I, Pg. 79-80). The outside of the mask turned gray-black (Vol. I, Pg. 80). He typically would use one dust mask for a workday when performing coupon or panel work (Vol. I, Pg. 81-82). He recalls complaining to management (supervisor and safety engineer) about the dust and odor

(Vol. I, Pg. 83). He does not recall seeing instructions or warnings for this type of dust mask (Vol. II, Pg. 108).

From start to finish, to drill and to sand a strip panel, it took 20-30 minutes. From start to finish, to drill and to sand a metal panel, it took 30-40 minutes. From start to finish, to drill and to sand a honeycomb panel, it took 15-20 minutes (Vol. II, Pg. 168). If the panels contained an adhesive, Mr. LaFrentz believes he would have breathed the dust produced from working with these coupons or panels (Vol. II, Pg. 169).

Mr. LaFrentz believes he was **exposed to asbestos** while working for General Dynamics (Vol. I, Pg. 64). He presents documentation relating to his exposure to asbestos; “It's a document from the inspector, safety inspector or I don't know exactly what her title was, but a lady came down to my work area and **tested the dust…”** (Vol. I, Pg. 63-64, 122) (Vol. II, Pg. 27-28, 159). “I contacted her and she set up a time when I would be doing this drilling [as a drill press operator], and she came down with some kind of a little machine. I can't describe it or know what it was, and she tested the air while I was drilling” (Vol. I, Pg. 83-84). Mr. LaFrentz was working on a “2-hole” strip panel during this air sampling event (Vol. II, Pg. 121). Mr. LaFrentz was given a copy of this air sampling data after testing was conducted and has been in Mr. LaFrentz’s possession since 1980 (Vol. I, Pg. 84-85) Mr. LaFrentz does not recall working conditions changing after this air sampling event (Vol. I, Pg. 86) (Vol. II, Pg. 159). He recalls still working with 2-hole strip panels after this sampling event (Vol. II, Pg. 122). B.J. Hallstein was the safety engineer, and she had “…no comment about it [whether it was safe or not safe to drill and sand coupons or panels, nor instructed to perform his work differently]” (Vol. I, Pg. 83, 85-86). He was given no instruction about the paper dust mask after air sampling occurred (Vol. I, Pg. 87). The contaminate mentioned on the inspection document was “asbestos”, and “[t]hat there was two fibers per centimeter allowed, and she received a concentration of 28.8 fibers per centimeter … 28.8” (Vol. I, Pg. 91). At the time he received the inspection document, Mr. LaFrentz “…really didn’t understand what asbestos was.” He did not become aware of asbestos until 1995 or 1996, when another employee (facilitator) was diagnosed with mesothelioma (Vol. I, Pg. 93-94). Counsel represents that the air sampling document references “’FM 3018 is used in adhesive of P653 panels” (Vol. II, Pg. 161, 169).

His **next position**, onsite was as a **NC Machinist**, for about 2 years, July 1982 to 1983 (Vol. I, Pg. 60-61) (Vol. II, Pg. 146-147). Regarding his work, “[w]orked on a five -- three and a five-axis machine milling and

drilling and everything that needed to be done to that particular part" (Vol. I, Pg. 60). He recalls sometimes wearing a respirator while in this position, "depending on how much spray was in the air…" (Vol. I, Pg. 86).

For his next position, until he retired in 2005, Mr. LaFrentz "…moved into **program security**" (Vol. I, Pg. 61). This position did not deal with combat aircraft, unlike the previous two positions (Vol. I, Pg. 129). Regarding his work in this position, "[l]et me see how I can say this. I had a top secret clearance with some side clearances. Worked in programs that had to be cleared by the government, and basically kept all of the documentation, the facilities, and the access list secured … the projects that we had we had to follow the government rules over the facilities that they were in. And I would -- we would have to set up contract, and I would go to these facilities as a government representative to approve the area, the location, the type of alarm systems, and the personnel" (Vol. I, Pg. 61-62, 113, 137-138). "I was in special programs and it was all R and D classified programs" (Vol. I, Pg. 130). In this position he visited other company facilities such as 3M in Minneapolis (3-4 times), MN; the regional Ford manufacturing plant in Detroit, MI; Capco in Milford, CT; (Vol. I, Pg. 62) (Vol. II, Pg. 108-110). He also visited "Wright-Pratt" in Ohio (Vol. I, Pg. 124). When traveling to different locations, his work did not involve coupons or panels (Vol. I, Pg. 138). He does not recall safety meetings while in this position (Vol. I, Pg. 96). While in this position, "I was involved with engineers that did this testing. I found out, you know, later what the heck these panels were I had been doing before … Worked with the engineers because I had to maintain security for the area, and so I was around some of the testing and some of the building up of parts and things like that" (Vol. I, Pg. 130). He recalls seeing the panels "drying" but doesn't recall the step-by-step process for their formation, "[t]hey were just in a -- put into a -- like a heat oven and just dried" (Vol. II, Pg. 163). Regarding the panel features, "[w]ell, on the, like, inch and a half wide ones the bottom side would look like some kind of an aluminum metal, and then you flip it over and the top side would look kind of, I don't know, gold-colored and it varied in -- in colors, but most of them were kind of a yellowy-gold color", but he doesn't know how they were bonded together (Vol. II, Pg. 164).

Regarding **aircraft construction**, "[p]ut together in one long strip of work areas, and different sections were fitted together as they went till they finally came out at the end ready for paint and motors were on and checked and everything. Ready to see -- ready to paint for final aircraft" (Vol. I, Pg. 128).

Mr. LaFrentz is shown several exhibits related to his work at General Dynamics (Vol. II, Pg. 29-32).

Personal Automotive Maintenance (1960-1988)

Between 1960 to 1988, Mr. LaFrentz performed automotive maintenance work on personal automobiles and family and friend automobiles; a “shadetree mechanic” (Vol. II, Pg. 75, 111, 132). His father’s brake changing activities below are similar to what Mr. LaFrentz performed in subsequent brake jobs from 1960 to 1988, Just what I learned, that’s the way I did it” (Vol. II, Pg. 81-82). He never paid attention the brands of brakes he purchased beyond which ones were the “…cheapest … at the auto parts store” (Vol. II, Pg. 82-83). He generally does not believe brake work is dusty work, “…if you’re kind of careful with it.” To avoid dust, “I would just be real careful if there was any dust there from the other pads. The used pads … I would wipe them off with a wet towel” (Vol. II, Pg. 83-84). He recalls being “careful” throughout this time period (Vol. II, Pg. 85).

He first recalls working on his father’s 1952 Buick; personally, changing spark plugs and changing the oil (Vol. II, Pg. 79-80). He saw his father change brakes on this vehicle, “[w]ell, he jacked it up and took the tire off and the drum off, and then released the springs on the brake pads and took the brake shoes off, and then he cleaned up, and then he turned around and put the brake shoes back on and put the springs on, and then he adjusted the brakes and then put the hub back on and the tire back on” (Vol. II, Pg. 81). He does not recall brake brands removed or installed (Vol. II, Pg. 82).

He believes from 1969 to 1989, he would have changed half a dozen to a dozen brakes, spread out through that time (Vol. II, Pg. 111). He generally did not wear a mask during brake work (Vol. II, Pg. 111). He recalls replacing a couple of clutches in 1982 to 1983, on a 1969 Dodge Ram pickup. He believes he may have removed a Dodge clutch but does not recall the brand of the replacement clutch (Vol. II, Pg. 132-134). He recalls replacing cardboard, cork-like gaskets for water pumps on several vehicles and replacing head gaskets. He does not recall the name brand of gaskets (Vol. II, Pg. 133, 135).

He recalls in 1984, he purchased an air compressor, and blew out some brakes, but he would wipe the brakes first, “[s]o it wasn’t very dusty”. He wore a paper dust mask (Vol. II, Pg. 84).